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INTERMEDIATE LOGIC

(DEDUCTION)

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BY

K. J. ABRAHAM, M. A.

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INTERMEDIATE LOGIC

(DEDUCTION)

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PREFACE

Suitable text books on Logic for the Indian students are too few and so any addition to them is to be welcomed.

This book is designed to meet the requirements of the students preparing for the Intermediate Examination. It is largly based on my lectures given to my students. It is of course, needless to say that I have consulted the standard works on the subject in preparing this volume.

I have taken care to present this highly abstract subject in as simple and clear a manner as possible. I have attempted to give without undue elaboration the essentials of the subject to keep the book handy. Exercises are given wherever necessary. I have deliberately refrained from indicating the solutions, leaving it to the students to work them out in the light of the principles explained.

I thank the Trichinopoly United Printers Ltd., for the timely execution of this work.

I shall be grateful for any suggestions for the improvement of this book.

Tiruchirapalli,
29—6—'55.

K. J. A.

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INTERMEDIATE LOGIC

Part I—Deduction

CHAPTER I

Definition and Scope of Logic

1. *What is Logic?* The study of Logic gives no exception to the customary difficulties and problems which arise in studying a new science. Though it is human nature to strive for a quick and early understanding of anything new, it is only a slow and patient endeavour which will throw light on the same. This being the case, the student of this subject should not get frustrated if he is not able to have a complete and comprehensive understanding of the subject from merely the present topic.

Distinctions are made between different things in this world based on certain qualities. Men and lower animals are distinguished on the basis of rationality. Rationality is the power of thinking and judging what is right or wrong. This quality is characteristic only of human beings. The lower animals are not in a position to make any judgment as to what is right or what is wrong. Their actions are purely instinctive ones. Logic deals with thinking and tries to make it a systematic science. As a result of this systematic enquiry Logic is able to give certain principles or norms on the basis which distinctions can be made between correct incorrect reasonings. As a result of the stud student will be able to understand the very mistakes he makes in his arguments and reasoning

The word Logic is not an original English w It is derived from the G word 'logos' which m thought. The et ol rigin of the word sh

that Logic is the study or the science of thinking. Thinking means the intellectual activity by means of which knowledge is obtained. Thinking is the instrument of all our knowledge. It is a mental activity but for which the mind will be a 'tabula rasa' (empty slate).

Logic may be defined as the science which deals with the principles of valid thinking. Logic is defined as a science. Let us see how logic is a science. A science is a systematic and exact body of knowledge pertaining to one particular aspect of this universe. For the sake of clearness and study this universe is divided into different parts, as for instance the plant world, the animal world etc. Each part or aspect is taken separately and studied in a systematic, exact and comprehensive way. This makes the study a scientific one. For example Botany deals with the plants, chemistry with the elements of Nature etc. So a science in the true sense should deal only with one aspect or part of this universe. Logic does so for it deals with only one aspect namely valid thinking. Secondly a science should give a systematic body of knowledge. Logic from this point of view also fulfils the requirement of being a science. It gives a well arranged and orderly information regarding valid thinking. Finally, a science should give exact knowledge. This is what exactly logic does. As a result of an exhaustive study of thinking, logic is able to furnish exact knowledge. So since logic possesses all the [illegible]ualities mentioned in the definition of the word science, [illegible] most aptly defined as a science.

[illegible]ogic is [illegible] science which deals with the principles [illegible]d thin[illegible] We have seen that logic is a science. [illegible]ave also [illegible]en what logic deals with thinking. Here [illegible]tempt may be made to know what is thinking. This attempt to know, is an in[illegible]nce of thinking. Thinking is the intellectual proce[illegible] means of which knowledge is obtained. It is a [illegible] p[illegible] which enables

us to know things. When the statement "I know this" is made the processes going on and referred to are much more than what an ordinary man feels about it. The different ways in which knowledge is obtained are through conception, Judgment and reasoning. These are the different functions or the operations of the human mind in trying to attain knowledge. As thinking is for knowledge and as thinking involves three processes for the attainment of knowledge, logic deals with all the three processes. A concept is a general idea obtained as a result of intellectual activity. This process leads to general ideas such as man, tree, book etc. A Judgement is the result of comparing two concepts, for instance, the concepts 'man' and 'mortality' are compared and the Judgment is made 'all men are mortal'. A reasoning is the result arrived at by comparing two judgments. For instance, the judgments 'All men are mortal' and 'Rama is a man' leads to the inference that Rama is mortal. This process is known as reasoning. Logic deals with all these three processes.

In the definition of logic, it is also given that it deals with valid thinking. Valid thinking means true or correct thinking. Logic is concerned only with correct thinking. To study correct thinking, the mistakes which generally creep in thinking should be known; as to appreciate light, one should know what is darkness. To study what is right, certain principles are required on the basis of which only, it can be said that a certain reasoning is right or wrong. Logic gives a number of such principles. This is why logic is called a normative science.

Some definitions of Logic:

(1) Creighton. "Logic is the science which treats of the operations of the human mind in its search for truth."

(2) Mill. "Logic is the science of the operations of the understanding which are subservient to the estimation of evidence, both the process itself of advancing from known truths to unkown and all other intellectual operations in so far as auxiliary to this."

(3) Mellone. "Logic is the science which deals with the principles of correct thinking."

2. *Logic and Psychology*: Comparisons generally help us in knowing the nature of things better. Hence the need arises for comparing logic with other sciences.

Psychology is the science of the mind. Woodworth defines Psychology as the science of behaviour in relation to the environment. It is an attempt to study everything regarding the working of the mind. It studies all the conscious processes, unconscious processes, abnormal activities—in short, every bit of the working of the mind.

The brief estimate given above regarding psychology clearly shows the great point of resemblance between logic and psychology. Both are mental sciences. Logic deals with thinking which is purely a mental process which involves certain subsidiary processes. Psychology also is a mental science. It is the science of the mind studying all its aspects like knowing, willing, feeling etc. In other words both are subjective sciences, i.e. sciences which deal with nothing outside the subject. The science of astronomy is objective for it deals with the celestial bodies which are outside objects.

In spite of the similarity between logic and psychology there are a few essential differences between the two. The field of psychology is much more wide than that of logic. Logic deals only with thinking which is but one of the innumerable mental processes. On the contrary, psychology deals with all the aspects of the mind. All the mental activities are studied by psychology, whether

concious, or unconcius, normal or abnormal, of the child or the adult. But logic is confined only to thinking.

Logic deals with thinking. Psychology also deals with thinking, in so far as it is a mental process. But both these sciences look at thinking from different angles. Psychology is interested in thinking only as a mental process. But logic is not interested in the process of thinking as such. Logic is concerned with the products of thinking ; Whether the result of the thought process is in conformity with the laws of logic or not. It is in the validity or truth of thinking that logic is interested in.

Another difference between logic and psychology is that, while logic is a normative science, psychology is a positive science. A normative science is one which has a norm or a standard on the basis of which Judgment is passed. Logic is a normative science because it has norms or standards by means of which a reasoning can be Judged to be true or false. A normative science deals with what ought to be. It is to decide what ought to be, that standards or norms are required. Psychology is a positive science for it gives only a factual account of the mental processes. A positive science is one which merely deals with what is. It gives only descriptions. This is another essential difference between the two.

Although much is said to differentiate logic and psychology, it is to be remembered that they are not absolutely independent. It is possible to break a piece of stone into two or more smaller bits and learn each bit independently. But the mind is not something which can be divided and studied in isolation. Further the distinction made between positive and normative sciences is not absolute. In fact each science supplements the other but for which no perfect knowledge is possible.

3. *Logic and language* : Language is the vehicle of thought. It is the means of expressing our thoughts

to another person. For this purpose there are words with fixed meanings. Good language consists in using these words appropriately. This is the function of language.

The etymology of the word logic shows that the word logic originates from the greek word 'logos' which means "thought" as well as "word." This shows the very close relation between thought and word or language. Logic is concerned directly with thought and thought is expressed in language. This leads to the logical conclusion that logic is concerned with language also. But by language, here we mean only the verbal expression of our ideas, the system of spoken and written words. If it is used only to denote any means which will convey ideas to others, then gestures, signs, symbols and even the wagging of the tail by the dog will become language. But logic is concerned with language which is the verbal expression of our ideas. Thus, as logic is concerned with thought and as thought is expressed in language, logic is indirectly connected to language.

Rhetoric being the science of studying language to bring out effectiveness in speech, may also be seen here in comparison with logic. Rhetoric is the art of forcible speech. Mere factual statements and blunt expressions seldom impress people. But effective expressions, apt comparisons and vivid and picturesque descriptions will capture any one in no time. This is the aim of rhetoric. From this, it seems that logic and rhetoric resemble in being commonly related to language. Logic is related to language, as thought with which logic deals, is expressed in language. This resemblance is only superficial. The aim of logic differs swidely from that of the other. Logic is not concerned with language directly. But rhetoric is directly related to language. It is effective language that is aimed at by rhetoric. Logic is bothered only about the validity of the thought contained

in the language. It may happen that sometimes good rhetoric might turn out to be bad logic. This is because of the fact that while logic appeals to the reasoning faculties, rhetoric appeals only to the emotions and feelings. Much of rhetoric can be heard on modern platforms, which in no time stirs up the emotions of the mob in whom reason is only a subsidiary faculty where lies the success of the self motivated speaker.

4. *Logic and Grammar*: Grammar deals with words and their correct use in sentences. It gives certain rules for the using of correct language. The expressions of a child or even a grown up man may be in some language, but often devoid of any grammar. So it is grammar which enables one to maintain correctness in speech and in writing.

Both logic and grammar are seem to be similar in so far as they both deal with language. But logic is only indirectly related to language, where as grammar is directly connected to language. Logic is interested in language only because, it is language which conveys thoughts. But grammar is solely and wholly concerned with language and its correctness.

Moreover grammar is not concerned with the material truth of the idea expressed in the form of language. For instance the statement 'all men are immortal' is perfectly grammatical. But logically it is absurd, for it is materially false. So logic is primarily concerned with the truth of the thought contained in the language. Hence it is said "Logic is the grammar of thought and grammar is the logic of language."

5. *Logic and Ethics*: Ethics is the science of conduct. It deals with what is right or wrong in conduct. Generally the real conduct of a person is expressed in his behaviour. But behaviour as such is studied by psychology. Ethics is not merely satisfied with the data

regarding behaviour. It is the inner motive which is more important in passing any verdict on the real conduct of the person. Ethics also is a normative science, since it gives certain standards for Judging conduct.

Logic and ethics are both normative sciences. Both are mental sciences too. But they differ in their subject-matter. Logic deals with valid thought and ethics deals with good conduct.

6. *Logic and Aesthetics*: Aesthetics is the science of beauty. It is the appreciation of beauty which is the subject matter of this science. This also is a normative science because the ideal of beauty is the standard. Logic and this science are normative sciences. But while Logic has truth as its ideal, beauty is the ideal of aesthetics. Logic appeals to reason, while aesthetics appeals to the finer feelings.

7. *Logic as on Art*: Logic is the science which deals with the principles of correct thinking. The definition of logic claims logic to be a science. We have seen already that logic is really a science as it possesses all the qualities of a science. Science is a systematic body of knowledge relating to one part of this universe. Logic deals with only one part of this universe, namely thought. Logic gives a systematic and orderly account of the subject matter. Everything is well arranged and intelligibly classified. Again in it, there is precision, accuracy and exactness. Thus, viewed from all points, it is quite reasonable to say that logic is ascience. But is it an art also? If so, to what extent? These are questions which have baffled many, and over which many contraversies exist. Mansel and Thomson are of the firm opinion that logic is a science. But Aldrich and others think that it is an art. At this juncture, to take a dispassionate view of things, it is better for us to know how an art and a science differ.

The word science comes from the Latin word 'scientia' which means knowledge. This shows that the ultimate aim of a science is knowledge. It enables us to know facts by supplying sufficient data regarding a certain object in a well arranged and systematic way. A science teaches us to know. But an art teaches us to do. An art gives a set of practical rules which help us to do some external task. The important characteristic of an art is that it guides us in doing things practically. For example the art of painting gives us a number of rules which will enable us to paint well. So too, the art of navigation or photography. Thus one main difference between the two is that while science teaches us to know, an art teaches us to do. Knowledge can be had by hard study. But to be an artist, one needs hard practice. It is only by repeated activity that a man becomes a good painter or a good photographer. When a doctor is first let loose on humanity, he sends many an unfortunate patient of his to the grave before he attains a certain amount of perfection in the art of healing.

Although a rather vivid discrimination is made here between science and art, it should be remembered that they are not independent ones. Art depends to a great extent on science. The art of navigation depends on the knowledge of sciences like physics, astronomy etc. The art of healing depends on sciences like physiology, anatomy, chemistry etc. It is only scientific discoveries which bring about the progress of an art. Similarly, sciences also depend on arts to a certain extent. Many sciences have taken shape only from certain arts. The science of grammar for example is an off shoot of the art of writing. The science of agriculture has developed only out of the art of cultivation. As scent to the Jasmine and sun to the day, art and science go hand in hand, each supplementing the other in the attainment of the ultimate goal.

We have seen above the real nature of the relationship between art and science. Now, can we regard logic as an art? It may be said that since logic helps us to think correctly, it can be regarded as an art. But, if perfection is the criterion of an art, no art is really an art. How many painters are there, who in spite of their knowledge of the rules of painting, do injustice to nature and innocent faces, on the canvas? Do not doctors, with the knowledge of the rules for their art, do otherwise, while they are intended to save human lives? But do we not call painting, and medicine arts? Arts can only help us in doing things. No art can ever give the guarantee to any person that he will become a real artist if he studies it. The same applies to logic too. Logic is not an art in the sense that it will make all its students infallible reasoners. But no doubt, it will help us quite a lot in avoiding mistakes and thinking correctly. In so far as logic helps us to think correctly by giving us rules, it can be regarded as an art. But logic is more a science. Only indirectly it is an art.

8. *Logic as the science of sciences*: Thinking is the instrument which leads to knowledge. The aim of any science is to attain knowledge. The astronomer tries to gain more and more knowledge regarding the heavenly bodies. The psychologist attempts to increase his knowledge regarding the nature and the working of the mind. But how do they try to get more knowledge? They do so, by exercising their thinking powers. Thus for the advancement of knowledge in any field thinking is most essential, but for which nothing is possible.

Each science has its own subject matter. For instance Botany deals with plants, zoology with animals etc. In arriving at knowledge, thinking is used. Logic as a science, like any other science uses thinking to arrive at correct knowledge. At the same time, the subject

matter of logic is thinking again. In logic we are thinking about thought. Thought is the subject of investigation and thinking is the method adopted for the same. All sciences should adhere to the logical principles other than which they become illogical and fallacious. Logic, thus, holds a place in every science; for all sciences should think logically. Hence logic is called *scientia scientiarum*, the science of sciences.

In support of the above view, certain logicians raise a point which is not quite sound. The names of many sciences end with 'logy;' for instance, Biology Psychology, Geology etc. This has led many over enthusiastic logicians to think that it represents the indispensable superiority which logic bears to those sciences. For according to them, all sciences come under logic, which evidently make them say that Biology is the logic of life, Psychology, the logic of the mind and so on. This extreme view is not quite plausible. It is true that logic has a place in all sciences to a certain entent. But it is not quite true to say that logic is related to any particular science. Logic is interested only in the type of thinking adopted in any science. It has nothing to do with the subject matter of any science as when they say that Biology is the logic of life.

9. *Logic as a Normative Science:* Sciences are classified into Positive and Normative sciences. Certain sciences are interested only in making descriptions and factual statements. For instance the science of Botany is interested only in making a systematic account of the plant world. Such sciences which are interested only in dealing with things as they are, are called Positive sciences. So a positive science is one which deals with things as they are, or as they exist in nature. Such sciences are known also as descriptive sciences for we have seen that these sciences are concerned only with descriptions. Contrary to this, the other set of sciences

called normative sciences deal with values. A normative science is one which deals with how things 'ought to be.' This indicates a clear value as the ideal of any normative science. To evaluate things, a norm or a standared is required. The very name normative science tells us that the norm is present there. The science of ethics is normative: It deals with coduct. But describing conduct is not the business of this science. It deals with how conduct ought to be. For this there is an ideal of goodness as the norm on the basis of which judgements are passed on conduct. Logic also is a normative science for it deals with how thinking ought to be. The mere descriptions regarding thinking are dealt with by psychology Logic has norms and standards by means of which verdicts may be passed on reasonings. Valid thinking is the ideal of logic. Hence logic is a normative science.

10. *The utility of Logic*: The study of logic is objected to by many. First of all, it is asked, if the study of logic is useful and aids valid thinking, why is it that many who have learned logic argue wrongly? The study of logic is only a systematic enquiry into the principles which govern valid thinking. As a result of this study, many priciples are formulated which help us to avoid the mistakes in reasonings. Logic gives no guarantee to any of its student that the study of logic will make him think correctly. When a painter learns the principles of painting, there is no guarantee that he will become a perfect artisit. But if he adheres perfectly to the principles he has learned, he can avoid many pitfalls and mistakes because he has learned them. So the argument that the study of logic is not useful, since many who study logic think wrongly, is not quite sound.

Secondly, it is argued that many who do not study logic think more correctly than many who have studied

logic. This being the case, is not the study of logic a waste? This is only another phase of the first objection. It is true that many who do not study logic think more logically than the students of logic If it is logic which makes man rational, all these who had existed before the compiling of logic into a science, should have thought illogically, which is quite impossible and absurd. As Locke says "God did not make man barely a two legged creative and leave it to Aristotle to make him rational." It may be answered that the better reasoning power formed in those who have not studied it, in no way reduces the value of logic as a science. When a person reasons correctly, inspite of his ignorance in the science of logic, he is unconsciously adhering to the principles of logic. This is why he reasons correctly. So, whenever one argues correctly, whether he is conscious or not, the logical principles operate there. There are many who paint better than those who have studied the art of painting. Does this mean that study of painting is useless? When one paints well he does so because he works on the lines of the art of painting, though unconsciously. Such persons, when they are trained in the art will do much better. The same applies to logic too.

After answering the criticisms, it is beneficial here to know the advantages of studying logic. The following are some of the important uses:—

(*a*) The very definition of logic shows that it gives us the principles which govern valid thinking. All the three processes of thinking are exhaustively studied. After doing so, all the mistakes liable to those processes are clearly stated. This will enable a real lover of truth to avoid those mistakes and as far as possible to go on correct lines. This knowledge regarding the principles and the mistakes is not only of self help. We can easily point out the errors committed by others and try to

rectify them. There by we save ourselves from being caught in others arguments as well as help others to reason correctly.

(*b*) More than the above use, the study of logic gives very good mental discipline. Physical exercise is necessary to keep the body healthy and fit. Similarly for mental health, exercise is needed. The study of logic gives plenty of scope for this. Mind needs this badly, for it is the human mind which makes and unmakes things in this world, next to God. Man is the crown of creation and man is ruled and guided by mind. "In the world" says Hamilton "there is nothing great but man and in man there is nothing great but mind." This being the state of affairs, mental discipline is absolutely essential for the well being of the world at large. The abstract nature of logic gives immense scope for intellectual gymnastics. This will help a lot in training the mind and keeping it fit and healthy.

(*c*) The study of logic is a necessary priliminary to the understanding of the nature of ultimate reality. Philosophy attempts to know the nature of reality behind all the apparent appearances in this world. It is not so easily done as it is said. To enquire into such things, one should be sufficiently suited in mind. This is why, while politicians and scientists crowd the world, a philosopher is rarely found in any age. The study of logic, as it gives sound training to the mind, facilitates the understanding of philosophical principles.

11. Logic as a Formal science: Logic is considered to be a formal science by some because according to them there is form for logic, but no matter. Logic deals with thought. The subject matter of logic is thought. The process involved in studying thought is thinking. So thinking, the process is itself made the object of thought. This made some logicians to conclude

that logic deals only with form having no matter. Every science has a different matter while the form is the same. Botany deals with plants and there is a way of dealing with it. But there is no such different matter for logic. It is from this point of view that some logicans call logic a formal science.

It is true that Logic deals with thinking and that the way adopted for the same also is thought. But it should be understand that matter and form are insepar-able. Those who call logic a formal science denying any matter to it, forget the fact that form cannot exist without matter and viceversa. Every object has form and matter. A book has a certain form and matter. So too with all material bodies. The one cannot remain without the other. It may happen that matter may be constant while form varies and form constant while matter varies. But both are inseparable. So it is prepos-terous to think of logic as a formal science, having only form.

CHAPTER II

Terms

1. *The unit of thought*: The most elementary form of thinking is known as Judgment. It is the unit of thought. A Judgment is the result of mentally comparing two concepts. When a Judgment is expres-sed in language, it is known as a proposition. When the concepts 'rose' and 'flower' are compared, the result is a Judgment namely 'the rose is a flower'. Judgments are more elementary than concepts because a concept is the result of many previous Judgments. So the unit of thought is Judgment. It is a simple pulsation of intelligence.

2. *Words and Terms*: It is seen above that when a Judgment is expressed verbally it becomes a proposition. A proposition in logic should have three things, namely, subject, predicate and copula. The subject is that about which something is said in the proposition. The predicate is that which is said about the subject. The copula is the connecting link between the subject and the predicate. For example, in the proposition 'Gold is a metal', 'gold' is the subject, 'metal', the predicate and 'is' is the copula.

A term is a word or group of words which stand as the subject or the predicate of a proposition. So the subjects and predicates of propositions are terms. A term may be made up of either one word or more than one word. e.g. *Rama* is *the tallest boy in the class*. Here 'Rama' is one term. 'The tallest boy in the class' is the other term.

Distinction should be made between words and terms. A word is either a letter or a combination of letters which gives a certain idea. All words are not terms because there are many words which are incapable of becoming the subject or the predicate of a logical proposition independently. Prepositions, conjunctions, articles etc. are of this nature. Such words are known as *Syncategorematic* words eg. 'the,' 'of,' 'but' etc. Words which can independently stand as the subject or the predicate of logical propositions are called *Categorematic* words. Eg. table, book, man etc. Syncategorematic words may join with categorematic words and thereby become part of a term.

3. *Classification of Terms*:

(*a*) *Simple and Composite terms*. A simple term is a one worded term. But a composite term is a term having more than one word.

(b) Singular, General and Collective Terms: A singular term is one which is used to denote only one particular thing in the same sense. eg. China, Kamaraja Nadar, this book etc. Singular terms are of two kinds: (1) Non-significant singular terms and (2) Significant singular terms.

1. A non-significant singular term is one which is used to denote one object only by referring to the name. All proper names are non-significant singular terms. The important point is that, in such terms no quality will be suggested of the object. eg. Pandit Nehru, Cauveri etc.

A significant singular term is one which denotes only one object by referring to its quality or significance. For example without telling the name, if it is said 'the present Prime-minister of India' it stands for Pandit Nehru. Here instead of telling the name, the person is denoted to by bringing out his essential quality of distinction eg. the highest mountain in the world, the first man who conquerred Everest, the tallest boy in the class etc.

A general term is one which can be applied to a group as well as the individuals that come-under it. For eg. the term 'man' refers to all men in the world. At the same time it can be applied to any member who comes under it. The formation of a general term is made on the ground of similarities between different objects. e.g. horse, book, mountain, tree etc.

Certain proper names are at times used as general terms such as 'a solomon' 'a Daniel' etc. When they are used as general terms, they refer to certain important attributes possessed by them. To refer to a wise person, the sentence 'he is a Solomon' may be used. Similarly 'a Daniel has come to Judgment' means that a just person has come to Judgment.

A collective term is one which is used to refer to a group as a whole. e.g. bunch, fleet, flock etc. The distributive use of the term will be wrong. For e.g. the term 'army' is used to denote a collection of soldiers. But distributively, it is wrong to use the same term 'army' to the individual soldiers. Here lies the difference between a general term and a collective term. A general term may be used collectively and distributively.

A collective term is singular if it is used to denote only one particular group. For e.g the Indian Army refers only to one group. If the collective term may be used to denote any group, it becomes a general term. The mere collective term 'army' is general for it refers to any army.

Sometimes, a collective term is used distributively also. e.g. the army fled in different directions; all the questions carry 15 marks each etc. The former means that the soldiers ran away in different directions and the latter means that each question carries 15 marks.

(*c*) *Concrete and Abstract terms*: A Concrete term is the name of a thing (person, place or object) and the object represented by the term is capable of being perceived by any of the sense organs. e.g. tree, table, book, building etc. An abstract term on the other hand is the name of a quality. This means that no sense organ will be able to perceive the same. For instance the term 'redness' is the name of a quality. We have seen a red flower or a red flag. But "redness" as such, in isolation from all concrete objects is purely imaginary. Adjectives are concrete terms because they cannote some concrete objects. For e. g. redness as it is, is abstract. But in, 'a red flower' red becomes concrete, being an adjective. In judging an abstract term one should be careful. If the abstract term is connected to a concrete term as an

adjective, or participle or in any other way, the abstract term becomes concrete e. g. His goodness. Here, goodness is concrete for it refers to 'his.'

(*d*) *Absolute and Relative terms:* An absoluet term is one which can stand by itself and give an independent meaning e. g. tree, book, house etc. On the contrary, relative term is on which can be understood only in relation to another term which is the correlative of the original. For e. g. the term 'husband' carries no independent meaning other than in relation to the term 'wife'. Thus relative terms go in pairs. Eg. teacher and student, king and subjects, parents and children etc.

(*e*) *Positive, Negative and Privative terms:* A positive term is one which implies the presence of a quality or qualities. For eg. the terms, chair, light, boat etc. are positive terms, since they imply the presence of certain attributes. Negative terms are those which imply the absence of a quality or qualities. For e.g. the terms, unkind, unfortunate, senseless, etc. are negative terms for they clearly show the absence of certain qualities. It is easy to find out negative terms generally for mostly they are charact erised by prefixes like un, not, non, dis, etc. But some times certain negative terms will appear to be positive, due to the absence of prefixes as the above said ones. eg. ignorance doubt, darkness etc.

A privative term is one which indicates the present absence of a certain quality which actually it should posses. eg. deaf, dumb, blind etc. These are privative terms for they imply the absence of certain qualities, which should be present normally.

Two terms which imply qualities which cannot be present in the same object at the same time are called incompatible terms. Such terms are two fold namely, contradictory and contrary terms. Contrary terms are

two terms which exclude each other but do not exhaust the field of enquiry. This means that these two terms imply qualities which cannot exist in the same object at the same time and that a middle ground is possible other than covered by the two terms. The terms white and red are contrary terms. They exclude each other. A third alternative is possible also namely blue or yellow.

Contradictory terms are two terms which exclude, each other and exhaust the field of enquiry. Contradictory terms exclude each other. At the same time, no middle ground or third alternative is possible over and above the two alternatives given by the two terms. eg. white and non-white, animate and inanimate etc. Here white and non-white covers all the colours. The entire field of enquiry is exhausted.

(*f*) *Univocal and Equivocal terms*: This is Jevon's classification of terms. A univocal term is one which gives only one meaning. eg. book, tree etc, But an equivocal term is one which gives more than one meaning. eg. pulse, light, lead etc. These terms have all, more than one meaning each.

4. *Denotation and Connotation of Terms* : Denotation (or extension) and connotation (or intension) are the two meanings which any term implies. Any term will denote or refer to a certain object. The number of objects indicated by a term is its denotation. For instance the term ' man ' denotes all men in this world. On the other hand the connotation of a term consists of the quality or the collection of qualities which it implies. So connotation refers to the qualities implied in a term. For instance, the connotations of the term 'man' are ' rationality ' and ' animality. The term ' triangle ' denotes all the triangles. It connotes the qualities which are common to all the triangles in general; say a plane figure, bound by three straight lines etc.

5. *Subjective, Objective and Logical Connotation*: We have just seen that connotation consists in the quality or qualities implied in a term. In illustration we pointed out that 'animality' and 'rationality' are the two connotations of man. The question arises here as to what exactly is connotation. Does it refer to all the qualities possessed by a term ? Or, can we take connotation to stand for only the known qualities of an object. There are three views on this questions. Some persons think that connotation refers to only the qualities that we know, the object to possess. This is known as the *Subjective Connotation.* Some others are of opinion that the connotation of a term consists of all the qualities possessed by the same, whether we are conscious of them or not. This is known as the *Objective Connotation.* Lastly, the *Logical Connotation* of a term consists of the essential attributes of the same. Other common attributes or qualities are ruled out here. In logic, we are concerned only with the Logical connotation or the conventional connotation. The subjective connotations vary with persons and their knowledge. Many of the objective connotations may be found to be common to other things and hence of no value. For instance the subjective and objective connotations of man will have in common qualities like, having two legs, two eyes, teeth, etc. which are common to other creatures as well. This is why, we are concerned only with conventional connotation in logic.

6. *Are there Non-connotative terms?* To answer this question one should know the distinction between connotative and non-connotative terms. A connotative term is one which has both denotation and connotation. It will connote certain qualities as well as refer to certain objects. On the contrary, a non-connotative term is one which has only either connotation or denotation. So non-connotative terms will either indicate certain

qualities or merely stand for certain objects. For instance the term 'Govind' is non-connotative for it is used only to denote a certain person. No quality is connoted by the same. But the term 'man' is connotative for it has both denotation and connotation. Mill is of opinion that proper names and abstract terms are non-connotative for according to him, the former has only denotation and the latter has only connotation. Let us examine both.

(*a*) *Proper names* are non-connotative according to J. S. Mill. Proper names are given to individuals only as a mark of indentification. More than this a proper name has no meaning. Mill says "Proper names are not connotative, they denote the individuals who are called by them, but they do not indicate or imply any attributes as belonging to those individuals." This statement of Mill clearly brings out his view. Proper names are merely means of indentifying persons or whatever they represent. It may be that a proper name has its origin due to some reason. It is likely that a new born baby is named after his grand-father or a saint. Even here, the names are given notbecause the infant possesses the qualities of his grand father or the saint. Mill himself gives the following example. The place Dartmouth is called so because it is situated at the month of the river Dart. Mill asks, if by any geological change, the mouth of the river is destroyed, will the name Dartmouth be changed, for no more it is the mouth of the river Dart? Certainly not. The place will continue to be called by the same name. Again when a child is born, it may be named Sundari. But when the child grows up into an young girl who happens to be the incarnation of ugliness, will the name be changed to suit the appearance? If names imply meanings, most of us will have to change our names. Moreover the name Napoleon need not be that of a man, for many four legged animals bear the same name.

Jevons takes the opposite view. His Contention is that proper names are connotative, *ie.* proper names have meanings or connote qualities as well as possess denotation. He agrees with the idea that proper names connote no qualities when they are given at first. But later on they acquire qualities. Before we come across a certain name, the name is not of any value to us, say a friend with the name John. But by constant association and relation with him we come to know of certain qualities and there after the name John imbibes some new meaning. This is just the nature of general names The general name 'dog' had absolutely no meaning before it was given to the animal. But now it means quite a lot to us. The same is the case with proper names too. Jevons says "Surely no one who uses the name England and knows what it denotes can be ignorant of the peculiar qualities and circumstances of the country and these form the connotation of the term" Again Jevons says that if we have no idea of the connotations of a person, how will we recognise him for a second time for he does not bear his name written upon his brow. It is only because we remember the connotations, that we are able to recognise persons and places. These are the arguments advanced by Jevons in support of his view.

Much has been said on both sides. It is now our turn to dispassionately view the problem and arrive at a conclusion. The entire controversy seems to centre round the word 'connotation.' The answer to the problem at hand depends on the interpretation given to the word 'connotation.' By connotation Mill means logical connotation. From this point of view, Mill is right in saying that proper names are non-connotative. Jevons says that those who know 'England' will know its connotations. But the name 'England' may as well be the name of a ship or a horse. On the whole, Mills view seems to be the better one.

(*b*) Abstract terms are non-connotative. Proper names are non-connotative in the sense that they have only denotation. But abstract terms are non-connotative as they possess only connotation, having no denotation. Abstract terms are only names of qualities in isolation from any material body. The term redness, for instance is merely the name of a quality. It does not denote any concrete object at all. But it is to be remembered here that in a sense, abstract terms possess denotation also. Qualities are related to objects, without which they are unintelligble. So abstract terms possess denotation also in an indirect manner.

7. *The Doctrine of Inverse Ratio*: Connotation and denotation are the two meanings which all terms possess. There seems to be a quantitative relation between the two. If the connotation of a term is increased, a decrease is found to take place in the denotation of that term. For instance the term 'man' denotes all man in the world. When the connotation of the same term is increased by the addition of the attribute 'civilized,' the term 'civilized man' refers only to a lesser number of persons than the denotation of the term 'man'. Again when another quality 'white' is added, the term becomes 'white civilized man'. Now the denotation becomes still smaller. Seeing this quantitative variation in connotation and denotation, it has been said that the connotation and the denotation of a term vary inversely. This mean that when the one increases, the other decreases and viceversa. The statement that connotation and denotation vary inversely or vary in inverse ratio, is subjected to cold criticism. The following are the most important criticisms.

(*a*) When the connotation or the denotation of a term is increased or decreased, we get a new term. The decrease or the increase is found only in the new term and not in the original. But the law of inverse ratio

holds that, the increase or decrease is found in the same term. For instance the term 'flower' refers to all the flowers in this world. When the connotation of this term is increased by the addition of the attribute 'red', we get a new term 'red flower'. It is the denotation of this new term which is lesser than that the original. But no decrease is found in the denotation of the original term. This goes against the conception of inverse ratio which states that the variation is formed in the same term. So the doctrine is unsound.

(*b*) It is absurd to speak of any increase or decrease, in the connotation or the denotation of a term. The connotations of a term are fixed and permanent whether we are aware of them or not. When the new quality of a matter is discovered, there is actually no increase in the connotation of that matter. It was already there. The same is the case with denotation. A certain term has all its connotations whether we know them or not. For instance, it is preposterous to say that after Columbus discovered America, the denotation of the term continent has increased. The term continent refers to all continents whether we are conscious of their existance or not. It is true that an increase or decrease in the connotation or denotation of a term may be found in our knowledge regarding the same. But it is not our knowledge which justifies the existence of qualities and objects. Hence it is not true to speak of any variation in the connotation or the denotation of a term.

(*c*) The doctrine of inverse ratio implies a mathematical variation between connotation and denotation. To estimate anything mathematically, quantitative data is essential. Connotations are qualities which are so complex that it is not possible to reduce them to figures in mathematics. Qualities are not elementary in nature. This being the case how can we calculate them or number them. Ofcourse, it is possible to count the denotations

of many terms. Here again there are certain denotations which are difficult to be counted. A mathematical comparision between two things is possible, only if we are able to count both the things. As this is impossible so far as connotation is concerned and rarely possible with regard to denotation, how can we speak of any mathematical variation between the two?

(*d*) Lastly, it is not quite true to speak of any ratio or proportion in the variation found between connotation and denotation. We speak of a proportionate variation only when there is quantitative agreement on both sides. If one side increases by one point and the other side decreases by two points, the same ratio should be kept up always. But this does not happen with regard to connotation and denotation in their variations. For instance when the quality 'white' is added to the term 'man' the term 'white men' refers to two thirds of the population of the world. But when another quality 'blindness' is added to the original term 'man' the term 'blind man' refers only to a very small fraction. This shows that the variation is not steady and proportionate. So, again, the law of inverse ratio is unjustifiable.

Exercises:

In describing the logical characteristics of a term, care should be taken to go through all the classifications and choose the appropriate ones.

State the logical characteristics of the following terms:—

(*a*) blind, (*b*) The Madras University, (*c*) city, (*d*) the highest mountain in the world, (*e*) Kindness

(*a*) blind

(1) Simple, because it is a one worded term.

(2) General, because it refers to any person who is blind.

(3) Concrete, because it is an adjective which qualifies some object which can be perceived.

(4) Absolute, since it can be understood by itself and gives a complete meaning.

(5) Privative, because, it shows the absence of a quality usually present in all.

Note :—It is necessary to write the answers giving reasons, as shown above.

(b) The Madras University.

(1) Composite (2) Singular (3) Concrete (4) Absolute (5) Positive.

(c) City:— (1) Single (2) General (3) Concrete (4) Absolute (5) Positive.

(d) The highest mountain in the world:—

(1) Composite (2) Singular (3) Concrete (4) Relative (5) Positive.

(e) Kindness:— (1) Simple (2) Singular (3) Abstract (4) Absolute (5) Positive.

CHAPTER III

The Predicables.

A Proposition in logic is the statement of the relation between two terms; a subject term and a predicate term. The predicate will be related to the subject in various ways. The relation which the predicate bears to the subject is known as a Predicable.

According to Aristotle predicables are four in number. They are (1) Genus (2) Differentia (3) Property and (4) Accident. Porphyry divided Predicables into five kinds namely, genus, species, differentia, Proprium and accidens. Porphyry is of opinion that in any proposition, the predicate will be any five of the predicables in relation to the subject.

(1) *Genus and Species:* A genus is a class which can be divided into smaller sub-classes. The big class thus divided into smaller classes is called the genus in relation to the smaller classes. The smaller classes into which a big class is divided are known as species, in relation to the big class. Genus and species are relative terms. To understand one, a knowledge of the other is necessary. We have seen at present that a genus is a genus, only in relation to the species and a species is so only in relation to its genus. For instance if we divide 'men' into 'white' and 'coloured', the term 'men' is the genus. The terms 'white' and 'coloured' are species. In a proposition, the predicate may be the genus of the subject or the species of the subject. In the proposition Gold is a metal, the predicate ' metal ' in the genus of the subject ' gold '.

The highest genus is called Summum genus. Over the *summum genus*, there cannot be any higher genus. For instance, the term 'being' allows no higher class of which it can become a part. It includes everything. The lowest species is called *infima species*. In logic the lowest species which cannot further be divided are individuals individual objects. For instance a person, a tree, a building etc. are infima species incapable of being further divided. The genus which is the nearest to a species is known as proximate genus. Similarly the class which is the nearest species is called proximate species. A remote genus is any genus other than the

nearest to a species. Similarly a remote species is any class other than the proximate species. The species which come under the same genus are called cognate or co-ordinate species in relation to one another. To illustrate let us divide 'beings', we may divide this into animate and inanimate beings; again animate into rational and irrational; rational into Indians and non-Indians etc. till ultimately we arrive at individual persons. Here 'being' is the summum genus and individual persons at the other end are the infima species. The proximate genus of 'Indians' is 'rational', the remote genus being 'animate'. The proximate species of 'animate' is 'rational' while its remote species is 'Indians.' 'Rational' and 'irrational' are cognate species. It should also be remembered here that genus and species are relative. A genus is a genus in relation to its species. It may be a species of another class at the same time. Similarly species will be a species as well as the genus of some other smaller classes. In the above example, 'rational' is a genus as well as a species.

2. *Differentia*: Differentia is one quality or a group of qualities which distinguishes one species from another species coming under the same genus. Differentia stands for the distinguishing quality or qualities. For instance the quality which distinguishes man from the other animals is rationality. This is the differentia of man. Differentia is a part of the connotation of a term. Again a triangle is distinguished from its other coordinate species such as a squares, rectangles etc. on the basis of its differentia namely 'bound by three straight lines.' It is differentia which enables us to distinguish one species from its other coordinate species.

3. *Proprium or Property*: Property is a quality which follows necessarily from the connotation of a term, but which is not a part of its connotation. This

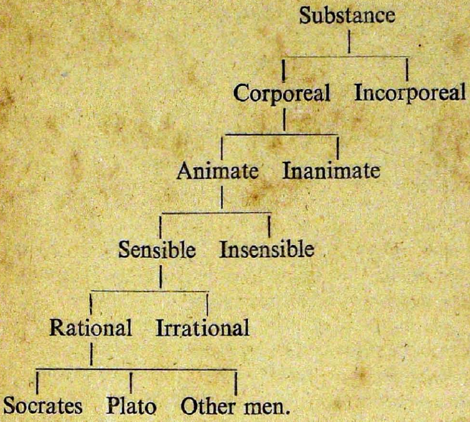
shows that a property, though is inseparable to the subject, does not form part of its connotation. For instance, the 'power of judging' in man is a quality which follows from the connotation of 'man,' namely rationality. Similarly take the proposition, 'Gold is a metal which sinks in water.' Here 'sinking in water' is a quality which follows from the connotation of gold, namely its density.

4. *Accidens or Accident*: An accident is a quality which forms neither a part of the connotation of term nor does it follow from the connotation. Many qualities are found in subjects which are accidents in this sense. It may be remembered here that accidents are neither differentias nor propriums for, the former forms part of the connotation of the subject while the latter follows from the connotation of the subject.

Accidens may be separable or inseparable. Each of the above may belong to a class or an individual. An inseparable accident of a class, is a quality which is found in every member of a class, for e. g. black colour in crows. Although we do not know why crows are black, blackness remains with all crows. A separable accident of a class is a quality which is accidental to certain members only of a group. For instance, sweetness is only a separable quality of fruits for all fruits are not sweet. Similarly, obedience in students, red colour in flowers etc. are separable accidents. An inseparable accident of an individual is a quality which is permanent in the individual; e.g. the colour of the eye, or the date of birth of a person. Finally a separable accident of an individual is the quality which is found in the individual only at times. For instance the particular shirt a person wears or his profession or his manners are all separable accidents.

Tree of Porphyry

Porphyry has given a table to illustrate the chief predicables. The following is the table :—



In this table, 'substance' is the summum genus, and 'man' is the infima species. The intermediate classes between 'substance' and 'man' are called subaltern genera and species. 'Sensible' is the proxinate genus of man ; 'animate' and 'corporeal' are the remote genera of man. 'rational' and 'irrational' are cognate species.

CHAPTER IV

Definition

1. *The Nature of Definition:* To define a term is to bring out clearly the significance or the meaning of the term. Proper definitions are highly essential in conveying thought. Definition is the explicit statement of the entire connotation of a term. When the essential qualities of a term are brought out clearly and intelligbly, the purpose of definition is served. Definitions of things are called *real definitions* where as definitions of words are called *Verbal* or *nominal definitions.*

Definition should be distinguished from description. To define, we have seen, is to make clear the meaning of a term. It is a process in the higher level compared to description. To describe is to make a vivid account of a thing. Descriptions depend upon the type of imagination possesed by the one who describes. He has to use his imagination and mix it with reality to make the description more attractive and colourful. After all, in kind, definition and description are the same.

2. *Systematic definition* (or Scientific definition) This is a process adopted in disclosing the position of an object in relation to the others in this world. In logical definition, we try to expose the meaning of terms. Modern science is not satisfied with mere definitions. The nature of the thing can be better exposed if its relation to the rest of the world is shown. It is based on the assumption that all the elements in this world depend on one another in a systematic way. So, systematic definition is a scientific way of explaining things by showing the exact position of an object as an element in a system.

3. *Genetic definition*: Genetic definition is the process adopted in showing the origin of an object or how an object has come into existence. The genetic method is useful very often in making us understand the nature of an object. The origin or the genesis of things is of immense use for the scientist. Anyway, the knowledge of the origin of any object enables us to understand that object better. eg. water is a chemical combination of hydrogen and oxygen; salt is a crystalline compound of sodium and chlorine.

4. *Rules of Logical Definition*: (1) A logical definition should state the essential qualities of the thing to be defined. The best way to do so, is by stating the nearest genus and the differentia of the thing to be defined. The genus will enable us to understand under what class, the thing to be defined is. The statement of the differentia will give us the distinguishing quality of the thing. This will enable us to distinguish the thing to be defined from its cognate species. This is why the time honoured rule of definition is that definition should be '*per genus et differentiam*'; i.e. the proximate genus and the differentia of the term should be stated.

(2) A definition should not state anything more or less than the entire connotation of the term to be defined.

The definition should state only the proximate genus and the differentia of the term to be defined. If any thing more or less is stated, fallacies are committed. The Central idea here is that in a definition there is no need for the statement of any qualities other than those required; neither anything less.

The statement of anything more than the entire connotation of the term leads to three fallacies, based on the quality that is added to the definition.

(*a*) If the property of the term to be defined is added, the definition is false and is known as a Redundant definition. Eg. A triangle is a plane figure bound by three straight lines and having three angles. Here 'having three angles' is the proprium of a triangle. If there are three sides, it follows that there will be three angles also. So the definition is fallacious. It is a redundant definition.

(*b*) If the quality added to the definition is the inseparable accident of the term to be defined, the definition is false and is called an Accidental definition. Eg. Man is a rational animal with two hands and two feet. Here the statement of the quality 'with two hands and two feet' happens to be an inseparable accident of man. So the definiti on commits the fallacy of accidental definition.

Eg. Man is a laughing rational animal. The dog is a domestic animal. A gentleman is a person who moves in good society.

(*c*) The addition of the separabe accident along with the definition results in the fallacy of too Narrow definition. The definition will become too narrow, because the separable quality added will not be found in all. For example, the definition, 'Man is a rational animal wearing suit'; is a too narrow definition, because, those who do not wear suit become nonmen according to this definition. Eg. Man is a civilized rational animal.

If any thing less than the entire connotation is stated, the definition commits the fallacy of Too Wide definition. The name too wide is given to this fallacy

because, the definition will welcome other things also, which are actually outside the scope of the term. Eg. Man is an animal. Here the differentia is not given. The definition becomes two wide because, according to this definition, other animals also will come under man.

eg. Gold is a metal.

Alcohol is a kind of medicine.

(3) The definition should not repeat the term defined or any other synonym of it. A term is defined so that its meaning is made clear to another person. So it is not correct to repeat the same term again. Sometimes another synonymous term may be repeated. This also will spoil the purpose of definition. If this rule is violated, the definition commits the fallacy of synonymous definition. Eg. Man is a human being. Truth is veracity in speech and action. Plant is a vegetable organism.

(4) A definition should be clearly expressed. It should not be obscure, ambiguous or figurative. It is to be remembered that a definition is intended to impart clearly and distinctly the meaning of the term. The using of big, ununderstandable and ambiguous words will make the definition commit the fallacy of obscure definition. eg. Eccentricity is peculiar idiosyncrasy. A net is a number of holes tied together. A girl is a perpendicular, biological phenomenon in short skirts.

If the definition contains any figure of speech like simile, metaphor etc., the definition is called a figurative definition. Eg. Man is the crown of creation; Necessity is the mother of invention; Child is the father of man.

(5) A definition should be affirmative as far as possible. Negative difinitions should be avoided where affirmative ones are possible. It is easy to make negative definitions for it is quite easy to say what a thing is not.

But the definition should say what the thing defined 'is'. If this rule is violated, the definition is false and is called a Negative definition. Eg. Mind is not matter; Life is the opposite of death; Ignorance is want of knowledge; Peace is the absence of war.

There are however certain terms which are best defined negatively. For instance in defining spiritual being, the definition can only be negative for we are not aware of the entire connotation.

5. *Limits of definition*: Though the rules of logical definition are given above, there are certain indefinable terms. They are (1) Summum genus. This cannot be defined as there is no higher genus to it. (2) Singular abstract names. These are names of elementary attributes. This renders the definition of such terms impossible. (3) Proper names and Individual objects. Proper names cannot be defined since they do not have connotation. Individual objects have an infinity of attributes and to enumerate all of them is not quite possible. We may describe their qualities; but no differentia can be stated. Hence they are indefinable.

Exercises:

Examine the following definitions:—

1. A Judge is a lawyer who exercises judicial functions.

This is a synonymous definition because the words 'Judge' and 'judicial' means almost the same.

2. A poet is an apostle of sweetness and light.

The definition is figurative because instead of giving the genus and the differentia of the term, merely a figurative description is given.

3. Man is a featherless biped.

This definition conveys nothing intelligble. Hence it is an obscure definition.

4. Man is a rational animal capable of studying logic.

This is a redundant definition because the proprium 'capable of studying logic' also is stated.

5. Gold is a precious metal.

As this definition states an inseparable accident namely 'precious' instead of the differentia, it is an accidental definition.

6. A triangle is a plane figure enclosed by 3 equal straight lines.

The word 'equal' denotes only a separable quality of the triangle. Hence the definition is a too narrow definition.

7. A table is a piece of furniture.

Since the diffentia is not given in the definition, the definition is too wide.

8. Wisdom is the avoidance of folly.

Here instead of stating what wisdom is, what it is not is stated. Hence it is a negative definition.

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CHAPTER V

Division

1. *What is logical division :* We have seen that logical definition is the process of bringing out clearly the entire connotation of a term. But logical division aims at the exposition of the denotation of a term. This does not mean that division is concerned with the enumeration of the objects denoted by a term. On the other hand, logical division is the division of a class into its sub-classes. This serves very well in knowing the denotation of a term. Logical division is concerned only with the division of a class and never of an individual.

2. *Division and Definition :* Logical definition is the statement of the entire cannotation of a term. It does so by stating the genus, and the differentia of the term to be defined. This is one way of making clear the significance of a term. Division on the other hand is concerned with the denotation of a term. So while definition is concerned with the connotation of a term, division is concerned with the denotation of a term. But both definition and division aim at one thing namely making clear the meaning of a term. They are not exclusive and independent processes. In fact the one aids and supplements the other. For instance, to define a term, we should know the genus of the term. This involves a knowledge of division. In division, we divide a class into its sub-classes. For example, animals are divided into men and beasts. This division involves a knowledge of the differentia of the sub-classes other than which no correct division is possible. So division in turn depends on definition. Definition and division jointly expose the significance of a term. These two processes result from

the double significance of a term namely connotation and denotation.

3. *Division and Classification*: Classification is defined by Carveth Read as "a mental grouping of facts or phenomena according to their resemblances and difference, so as best to serve some purpose." This statement implies that classification is a grouping of things according to their resemblances and differences. Things which are similar to one another are placed under one group while those which differ from one another are placed under different groups. Classification whether scientific or with a special purpose, simplifies complexities and enables us to see things in a systematic manner. For instance when the different individuals in India are classified under different groups based on the different languages they speak, one gets a very good idea of the people in India from one point of view. Thus classification aids systematisation.

We may now compare classification with division. Division is the process of dividing or analysing a class into its sub-classes. For example men are divided into smaller groups like Indians, Americans etc. But in classification we proceed from individuals to groups. Individuals are first taken and based on their resemblance or difference, we classify them under certain groups. Thus the one seems to be the reverse process of the other. While division is an analytic process, classification is a synthetic or unifying process. For instance in division, we divide Indians into Tamilians, Malayalis etc., where as in classification, we start with individual persons and group them under a class namely Tamilians, However, it should be remembered that, fundamentally, the two processcs are the same. They do not differ in essence. In division and in classification, we group things which are alike, and separate those which differ.

Classification is of two kinds. They are scientific classification and artificial classification. The former aims at the grouping of individuals based on the important points of similarity for the purpose of acquiring general knowledge about them. Artificial classification is the grouping of individual things based on certain qualities arbitrarily taken for this purpose alone. eg. The classification of plants by a botanist is an example for the former while the grouping of flowers or stamps on the basis of colour is illustrative of the latter.

4. *Rules of Logical Division:* (1) Logical division is the dividing of a class and not of an individual.

This is implied in the very nature of division. A class is always divided into its sub-classes. But never an individual is divided. The division of an individual leads to non-logical divisions, such as physical division and Metaphysical division.

(2) In a logical division, there must be only one fundamentum divisionis or principle of division at one time.

This is a very important rule. The rule grants only one principle of division at one time. A fundamentum divisionis or a principle of division is the standard on the basis of which division is made. For eg. we divide men into Hindus, Christians, Muslims etc. on the basis of religion. So here 'religion' is the fundamentum divisionis. This should be only one at one time in a division.

The violation of this rule leads to the fallacy of *cross division.* Eg. the division of men into, Indians, English men and lawyers. In this division the principles adopted are two, nationality for the first two and profession for the last. Hence this division commits the fallacy of cross division.

(3) In a logical division, the sub-classes should be quantitatively equal to the original class.

The idea of this rule is to see that nothing is left out in the course of division. The sub-classes taken together should be equal in number to the original class. The violation of this rule leads to the fallacy of too narrow division. The division is called so because something is left out. eg. Men into Hindus and Muslims, or men into teachers, lawyers and doctors. The above divisions are too narrow for they leave out many men. The total of the sub-classes amount to only less than the original class divided.

(4) In a logical division, the sub-classes must be mutally exclusive.

The sub-classes into which we divide a class should not overlap. One member of one sub-class should not fall in another class at the same time. If it happens so, the division commits the fallacy of overlapping division. For eg. the division of students into intermediate students, B.A. students and history students, is of this kind. A student may be an intermediate student or a B.A. student and be a student of history at the same time.

(5) In a continued logical division each step should give the proximate species.

This rule forbids the leaving out of any intermediate class. Division should proceed step by step. Otherwise it will become too narrow.

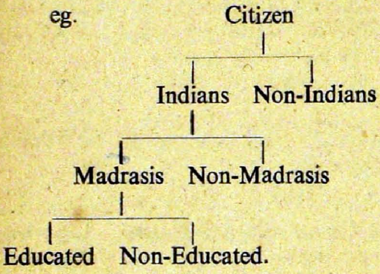
5. *Other Non-logical Divisions :* (*a*) Physical partition. Physical partition is the dividing of an individual object into its parts. For eg. the division of a tree into stem, roots, branches etc. or the division of man into head, abdomen, limbs etc. are cases of physical division. This is non-logical since logical

division is always of a class and never of an individual object.

(*b*) Metaphysical division. This consists in the analysis of an object into its qualities; eg. the analysis of man into his qualities namely rationality and animality. Again the analysis of water into its qualities such as being transparent, liquid; colourless, tasteless etc., is another instance of metaphysical division.

6. *Division by Dichotomy:* Division by dichotomy is the process of dividing a class into two sub-classes, one positive and the other, its negative. This kind of division is based on the law of excluded middle. According to the law of excluded middle, there is no midway possible between two contradictories. The two contradictories exhaust everything in the world. For instance, the terms 'man' and 'non man' cover every existing object. In a continued division by dichotomy, each positive class in turn is divided into its sub-classes.

eg.



Division by dichotomy satisfies most of the conditions of logical division. Moreover, when all the sub-classes of a genus are not known, this method is very useful. For instance ignorance of all the races of India may be happily covered up by dividing Indians into Aryans and non-Aryans.

Criticism: The most unhappy thing about division by dichotomy is that it leaves one sub-class at each step in obscurity. Clearness, which is the aim of logic, is absent here; for often we are not sure of the denotation of one sub-class. Further, in this division, there is no certainty regarding the reality of the sub-classes. Moreover, the process itself is a lengthy and tedious one. It appears that in division by dichotomy one sub-class is given more importance than the other. In the illustration given above, for instance, the division of 'citizens' into 'Indians,' seems to be more assertive than the other sub-class i.e. 'non-Indians.'

Exercises:

Examine the following divisions:—

1. Newspapers into, Congress, Justice Party and Tamil.

In this division, the fundamentum divisionis, is not one. The first two divisions are based on 'party' while 'language' is the principle used for the third. Hence the fallacy of cross division.

This division commits the fallacy of overlapping division also, because Congress or Justice party paper may be in Tamil.

2. Chair into legs, back and seat.

This is a non-logical division known as physical division, because an individual object is divided into its parts.

3. Mind into feeling, thinking and willing.

This division, as it gives an analysis of the mind into its attributes, is known as metaphysical division.

4. Colleges into science, arts and law colleges.

The division obviously, is not exhaustive, for there are many other kinds of colleges, like medical college, engineering college etc. Hence the division is too narrow.

CHAPTER VI

Propositions

The analysis of a Proposition: A proposition in logic, is the explicit statement of the relation between two terms. It should necessarily have two terms; namely a subject term and a predicate term. These two terms are connected by what is called a 'copula' These are the 3 parts of a proposition The subject term is that about which something is stated. That which is stated about the subject is the predicate. For instance in the proposition, 'all men are mortal', the subject term is 'man' for it is about 'men' that something is stated in the Proposition. 'Mortal' is the Predicate term, for that is what is asserted of 'all men'. The copula here is 'are'. A copula is used merely to express our judging. The copula should always consist of the present tense of the verb 'to be'. The copula may take any form of the verb, which are; is, is not; are, are not; am, am not and art or art not, depending on the circumstances.

Distinction should be made between a proposition and a sentence. A logical proposition is the expression of a Judgment. The proposition should conform to certain requirements namely the presence of a subject term, predicate term and a copula. A sentence need not necessarily express thought alone. Anything may be expressed in a sentence, say feeling, command, question etc. Neither should the grammatical sentence take only the forms assumed by a logical proposition.

Grammatically a sentence may be correct. But if it does not adhere to the requirements of a logical proposition, it will never be called a proposition. Hence it is said that, though all propositions are correct sentences, all correct sentences are not logical propositions. A logical proposition aims as the clearness of expression. Many sentences are obscure and ambiguous. This is why, we in logic, reduce sentences into logical propositions.

2. *Classification of Propositions* : Propositions are classified on the basis of relation and quality.

(*a*) According to relations, propositions are of two kinds namely *categorical* and *conditional*. A categorical proposition is the unconditional statement of the relation between the subject and the predicate. For eg. the proposition ' All crows are black ' is categorical because it unconditionally asserts the relation between 'crows' and 'blackness. In a categorical proposition, the predicate is either affirmed or denied of the subject. A conditional proposition on the other hand is one, which affirms or denies the relation between the subject and the predicate under a condition. Conditional propositions are of two kinds, *viz*. hypothetical and disjunctive propositions In a hypothetical proposition, the condition is expressed mostly by the word ' if '. eg. If it rains, the ground will be wet. A hypothetical proposition has two parts ; known as antecedent and consequent. The antecedent is that part which expresses the condition and the consequent, the other part which expresses the effect or the result. In the above example ' if it rains ' is the antecedent and 'the ground will be wet' is the consequent. A disjunctive proposition is one which makes an alternative assertion. eg. Either he is good, or he is bad.

(*b*) According to quality, propositions are divided into *affirmative* and *negative*. In a proposition the predicate is either affirmed or denied of the subject. If the

predicate is affirmed of the subject, the proposition is affirmative in quality. Such propositions are always of the form 'S is P' eg. Oranges are sweet; flowers are beautiful etc. On the other hand, if in a proposition, the predicate is denied of the subject, the proposition is negative. This is of the form 'S is not P' eg. Men are not angels.

(*c*) Based on quantity, propositions are divided into *universal* and *particular*. The quantity of a proposition depends upon the denotation of the subject of the proposition. If the predicate of the proposition is affirmed or denied of the subject completely, or as a whole, the proposition is universal in quantity. eg. 'All men are mortal.' In this proposition, the predicate 'mortal' is affirmed of the subject taken as a whole, i.e. 'all men.' Similarly, in the proposition 'No crows are white' the predicate is denied of the entire subject. On the other hand, a particular proposition is one in which the predicate is affirmed or denied of only a part of the subject. eg. Some flowers are red. Here the predicate 'red' is affirmed only of 'some' flowers and not all. Again in the proposition 'some men are not honest' the predicate is denied of only a part of the subject, 'men.'

If the subject of a proposition is a singular term, it is called a singular proposition. eg. The highest mountain in the world, is Mount Everest; The tallest boy in this class, is Rama; Krishna is mortal. Such propositions are to be treated as universal because the subjects are indivisible units.

As a result of the two-fold classification of propositions based on quality and quantity, combining them we get four kinds of propositions. They are (1) universal affirmative, (2) universal negative (3) Particular affirmative, (4) Particular negative.

A universal affirmative proposition is one where the predicate of the proposition is affimed of the whole subject. This proposition is symbolised by the vowel A. It is always in the form, 'All S is P' (SAP) Here as well as for the other propositions, the letter 'S' stands for the subject and the letter 'P' represents the predicate. The symbol 'A' in the middle of the latter, indicates the fact that it is a universal affirmative proposition. In this way, all the propositions may be expressed in the form of symbols. A universal negative proposition is symbolised by the letter 'E' and is always of the form No S is P (SEP). A particular affirmative proposition is represented by the vowel 'I' and is of the form 'Some S is P' (SIP). The vowel, 'O' represents a particular negative Proposition and is of the form 'Some S is not P' (SOP). It should be remembered here that any categorical proposition should adhere to any one of these four forms, except a few, which shall be dealt with shortly. The four forms are given below:—

1.	Universal affirmative	A	All S is P	(SAP)
2.	Universal Negative	E	No S is P	(SEP)
3.	Particular affirmative	I	Some S is P	(SIP)
4.	Particular negative	O	Some S is not P	(SOP)

A few more words need to be said here to clarify matters further with regard to certain propositions. The usual answer which an ordinary student blurts out to the question, what is the universal negative of " All men are mortal " is " All men are not mortal." This proposition is not universal since it only means that some men are not mortal. The predicate should be denied completely of the subject. This can be done only by adhering to the form 'No S is P.' So the correct 'E' proposition of the original is 'No men are mortal.'

Particular propositions, we have seem invariably start with the word 'some.' The word 'some' in logic

has a wide denotation, ranging from one to 99 out of 100. But in ordinary language, 'some' is used to denote only a minority of cases. In logic if the denotation is to one or anything less than the entire class, the word 'some' should be used. For instance, if we want to represent in logical terms, the death of 99 passengers out of 100, in a plane crash, we should say 'some passengers are those who died in the plane crash.'

3. *Reduction of Sentences to Logical Form*: We have seen that the four types of categorical propositions recognised in logic are A, E, I and O. So, sentences should be reduced to any one of the four forms, as the case may be. A few hints are given below, which will help the reduction of sentences into their logical form.

(1) The reduced sentence should adhere to any one of the four forms, namely A, E, I and O.

(2) Care should be taken to see that, the meaning is not affected in any way. The logical form must have just the same meaning as that of the original. In fact only after understanding the meaning, one should reduce it.

(3) The subject and the predicate should be placed in their proper positions, if they are not so. So one should first find out the real subject and the predicate. The subject can be understood by finding out 'what the statement is made about' That which is said about the subject should be taken to be the predicate. Then arrange the two in their proper places For eg. in the sentence 'Blessed are the poor' the subject and the predicate are in the wrong places. So rewrite the sentence as 'The (all) poor persons are blessed'.

(4) No proposition is perfect without a copula. Hence, according to the need, use the correct copula.

(5) The correct quantity should be determined. By understanding the complete meaning of the sentence and after finding out the real subject, the quantity of the proposition may be determined.

(6) (*a*) Propositions containing the words, all, any, each, every, always, the, he, who, whoever, a, etc. are to be reduced to A propositions.

Eg 1. Any student can answer this =
All students are those who can answer this. (SAP)

2. Every Indian is free =
All Indians are free. (SAP)

3. He is great, who conquers his passions. All persons who conquer their passions are great (SAP)

(*b*) Propositions containing the words all, every any, each etc, with the sign of negation 'not' are to be generally regarded as 'O' Propositions.

1. All books are not good = Some books are not good. (SOP)
2. Every student is not hard working = Some students are not hard working (SOP)
3. Not all Politicians are sincere = Some Politicians are not sincere. (SOP)

Sometimes a propositions of the same form may be an E. Proposition. Hence one should pay more importance to the meaning so that the form may not misguide him. eg. All the doctors in the would cannot save you = No doctors in the world are those who can save you. (SEP)

(7) Words like no, none, never, nothing etc. in a Proposition indicates that it is an E Proposition. eg. Brave men never fear danger = No brave men are those who fear danger. (SEP)

(8) Propositions containing the words, most many, several, often, a few, almost all, all but one, sometimes, frequently, generally, nearly always, perhaps etc. without the sign of negation should be reduced to I proposition and with the sign of negation to O' proposition.

1. Most of the flowers are Pretty = Some flowers are pretty (SIP)
2. Several students were absent = Some students are persons who were absent. (SIP)
3. A few fruits are not sweet = Some fruits are not sweet. (SOP)

(9) Propositions with seldom, scarcely, hardly, few etc. are to be treated as O propositions, but with the sign of negation as I propositions.

1. People seldom realise the difficulties of others = Some people are not those who realise the difficulties of others. (SOP)
2. Few men are above temptation = Some men are not above temptation. (SOP)
3. Few men are not selfish = Some men are selfish. (SIP)

(10) There are some propositions called Exclusive propositions. Such propositions are marked by the presence of such words as, only, alone, none-but, no one else but, none except etc. which limit the subject. There are three ways of reducing such a proposition. (*a*) we may reduce it into an 'A' proposition by inverting the subject and the predicate of the given one. (*b*) It may be reduced into an E proposition by retaining the same predicate and by taking the contradictory of the original subject, everything else remaining the same. (*c*) Thirdly we may change it into an 'I' proposition by

merely stating it as an 'I' proposition. This is not generally used.

eg. 1. Only the brave deserve the fair =

(*a*) All those who deserve the fair are brave. (SAP)

(*b*) No non-brave persons are those who deserve the fair. (SEP)

(*c*) Some brave persons are those who deserve the fair. (SIP)

2. Graduates alone are eligible =

(*a*) All eligible persons are graduates.

(*b*) No non-graduates are eligible.

(11) Exceptive propositions. These are propositions in which the predicate is affirmed of the whole subject, with the exception of certain cases. The exception is indicated by words like, except, unless, but etc. If the exception is clear, treat the proposition as universal, if not as particular.

eg. All metals except mercury are solid. This is in the logical form and is an A proposition since the exception is definitely stated. But the proposition, 'All metals except one are solid' is particular since the exception is not clear. It should be reduced to 'some metals are solid'. (SIP.)

(12) Indefinite or Indesignate Propositions. In some propositions, the quantity may not be clearly given. They are known as indefinite propositions. Here, one should use his discretion and see whether the proposition is universal or particular because from the appearance alone it is difficult to Judge the quantity. Understanding the meaning is always the safest guide in reducing a sentence to its logical form.

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eg. 1. Men are mortal = All men are mortal. (SAP)

2. Flowers are fragrant = Some flowers are fragrant. (SIP)

(13) All singular propositions are to be treated as universal, affirmative or negative according to the sign of negation. In such propositions, there is no need to give any quantity mark such as 'all' or 'some'.

eg. The Prime minister of India is Pandit Nehru. (SAP)

Rama is not an athlete. (SEP)

(14) Interrogative Sentences. If we are sure of the answer to a certain question, then it is not difficult to reduce the question or interrogative sentence into logical form.

eg. Breathes there the man soul so dead =

No men with soul so dead are persons who breathe. (SEP)

4. *Distribution of Terms*: There are two terms in any logical proposition. If a term is taken in its entire denotation or taken as a whole, that term is said to be distributed. A term is undistributed, only when a part of its denotation is taken into consideration. We shall go through the four types of categorical propositions and see which terms are distributed in them.

(*a*) A Proposition. Let us consider the proposition 'all men are mortal'. Here the subject is taken as a whole. So it is distributed. But the predicate is not distributed because the statement does not mean, 'all mortals are men'. Men form only a part of 'mortals'. Hence an A proposition distributes only its subject.

(*b*) E Proposition. eg. No triangles are squares. The subject term is distributed here because the quality of 'being a square' is denied completely of all the triangles. In ihe same way the predicate 'squares' also

is taken in its entire denotation. Triangles and 'squares' are exclusive terms. So the predicate also is distributed. Hence an E proposition distributes both its subject and predicate.

(*c*) I Proposition. The very fact that this is a particular proposition tells us that the subject is not taken as a whole. So the subject is not distributed. In an I proposition, only a part of the predicate is taken into consideration. eg. Some books are red. This only means that some books are some of the red things. So the predicate also is not distributed.

(*d*) O proposition. The subject is undistributed here also for the same reason as in the above. Let us consider the predicate eg. Some flowers are not white. Here the predicate whiteness is taken as a whole and denied, to some flowers. So the predicate is distributed.

From the above, we may conclude that (*a*) universal propositions (A & E) distribute their subjects. (*b*) Particular propositions (I & O) do not distribute their subjects (*c*) Negative propositions (E & O) distribute their predicates (*d*) Affirmative propositions (A & I) do not distribute their predicates. We may sum up the individual results as follows :—

A	Proposition	distributes	only subject.
E	,,	,,	both subject & predicate.
I	,,	,,	neither.
O	,,	,,	only the predicate.

5. *Euler's Circles*: Euler, a distinguished Swiss logician, represented the relations between the subject and the predicate terms, understood in denotation, by means of circles. The following are the circles :—

Figure I stands for A proposition. In a universal affirmative proposition, the subject forms part of the denotation of the predicate. eg. 'All men are mortal.' Here

the subject (S) 'Man' forms part of 'mortal beings.' (P) The small circle represents the denotation of S and the big circle represents the denotation of P.

Sometimes, in certain A propositions, the denotation of the subject may be equal in extent to that of the predicate. e.g. All equilateral triangles are equiangular. There are no equiangular triangles which are other than

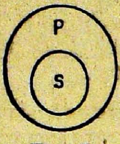


Fig. I.

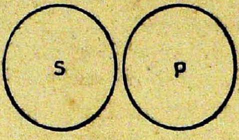


Fig. II.

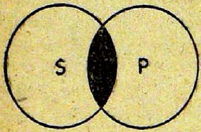


Fig. III.

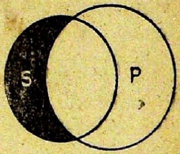


Fig. IV.

equilateral. This may be represented geometrically by one circle covering exactly another circle, the result being only one circle.

Figure II represents E proposition. The denotation of S in No S is P, has absolutely nothing to do with that of P. 'No men are angels'; is an E proposition, which demonstrates this. There is complete exclusion between 'men' and 'angels.' This is why E is represented by two independent circles, one standing for S and the other standing for P.

I proposition is represented by Fig. III. The two circles overlap each other. A part of the subject falls inside the predicate. For example in the proposition

'Some fruits are sweet' a part of the subject is identical with a part of the predicate.

Figure IV represents O proposition. eg. Some stones are not heavy. The predicate completely excludes a part of the subject. That portion which is excluded is the shaded portion in the figure.

6. *The Import of Propositions*: Though we have seen the ways of interpreting the relation between subject and predicate from the point of denotation, there are other views as well. The import of propositions signifies the meaning of propositions. This is an attempt to understand the real nature of a predication. Each proposition has two terms and each term has two meanings, *ie*, connotation and denotation. So there are four ways of interpreting the meaning of propositions.

(*a*) The Predicative view: According to this view which is the ordinary commonsense view, the subject of a proposition is taken in its denotation and the predicate in its connotation. Taken thus, the meaning of a proposition amounts to the affirmation or the denial of the denotation of the subject by the connotation of the predicate. e. g. 'All men are mortal' means the quality 'mortality' belongs to 'all men'.

(*b*) The denotative view: Denotation is given more importance here. According to this view, the meaning of a proposition is to be understood by taking the subject and the predicate in their denotation. The individuals denoted by the subject is either included in or excluded from the denotation of the predicate. eg. 'All men are mortal'. This means that the class of men form a part of mortal beings.

(*c*) The connotative or Attributive view: According to this view, the subject and the predicate of a proposition should be taken in terms of their connotation. This will give the meaning of the proposition. eg.

'All men are mortal' means that the qualities possessed by 'men' are related to the attribute 'mortality'.

The proposition 'No men are angles' means that the connotation of 'man' does not form part or has nothing to do with, the connotation of 'angels'.

(*d*) The connotative—Denotative View. According to this view the subject and the predicate may be taken in connotation and denotation respectively. The attribute possessed by the subject, either belongs or does not belong to the denotation of the predicate. eg. All men are mortal'; means that the quality of humanity agrees with some mortal beings.

Aristotle is in favour of the predicative view, and his classification of categorical proposition into A, E, I and O, are based on the same. Of all the views, this view appears to be the most satisfactory. The other views are artificial and unnatural.

Exercises :

Reduce the following sentences into their logical form :—

1. Every mistake is not culpable =
   Some mistakes are not culpable. (SOP)
2. A burnt child dreads the fire,
   All burnt children are those who dread the fire (SAP)
3. Only the educated are fit to vote.
   (*a*) All persons fit to vote are educated persons. (SAP)
   (*b*) No non-educated persons are fit to vote. (SEP)
4. Many a flower is born to blush unseen
   Some flowers are born to blush unseen (SIP)
5. All is not gold, that glitters =
   Some things which glitter are not gold. (SOP)

6. It rains.
   The weather is rainy. (SAP)
7. Some of the valuable books are seldom read.
   Some of the valuable books are not read. (SOP)
8. Things are not what they seen.
   Some things are not what they seen. (SOP)
9. All but a few were taken prisoners.
   Some persons are those who were taken prisoners. (SIP)

N.B:— Study well and grasp the points given for the reduction of sentences. Do as many exercises as possible until you become thorough. There is no point in looking at the questions and answers. Look at the questions, solve them and then refer to the answer to verify your answer.

CHAPTER VII

The Laws of Thought

Every branch of knowledge is based on certain laws. Logic deals with correct thinking and the attainment of knowledge in this field is based on certain laws. A law is the statement of a general truth which holds good every where. According to Aristotle, the laws of thought are, *the Law of Identity*, *the Law of Contradiction* and *the Law of Excluded Middle*. Another law known as the *Law of Sufficient Reason* was added on to the above three by Leibnitz.

1. *The law of identity*: The law of identity is expressed in the form, "A is A" or "whatever is, is." The statement 'A is A' seems to be meaningless at first. For instance, what is the point in saying that Rama is Rama, or that a stone is a stone. Though

Rama is Rama, he undergoes change during every second of his existence. In fact the Rama of this moment is different from the Rama of the next moment. The law of identity expresses the factor of unity in all the changes that take place in this world. Deductive Logic does not take notice of such changes, but assumes a thing to be identical always, inspite of superficial changes.

2. *The Law of Contradiction*: This law is stated in the form, 'A cannot be both B and not B.' This means that an object cannot possess two contradictory qualities at the same time. Man cannot be man and non-man at the same time. Similarly, it is not correct to say that a flower is red and non-red at the same time. This law is known also as the law of non-contradiction.

3. *The Law of Excluded Middle*: This law may be expressed in the form, 'A is either B or not B.' According to this law, two contradictory qualities B and not B, cannot both be false, regarding the same object namely A. In the law of contradiction, we have seen that two contradictories cannot be true at the same time. But the present law holds that both cannot be false at the same time. If one is false, the other should be true. e.g. if a flower is not 'red,' it should be 'non-red.' The law of excluded middle shows that the flower cannot be 'red' and 'non-red' at the same time. If it is not one, it should be the other.

4. *The Law of Sufficient Reason*: This law may be stated thus: every thing that happens must have a reason why it is so and not otherwise. This means that everything that exists has sufficient reason which makes its existence necessary. This reason explains why the object is not other than what it is.

It has been asked, of all the laws, which law is more fundamental. The answer cannot be in favour of any

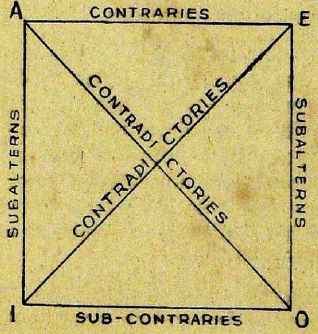
one law, for each law is fundamental from its own point of view. The ultimate purpose of all the laws, is to disclose the systematic nature of reality. Thought cannot function, unless we adhere to these principles.

CHAPTER VIII

Opposition of Propositions

1. *What is opposition?* We have seen that there are four kinds of categorical propositions based on quality and quantity. If two propositions, having the same subject and the same predicate differ either in quality or in quantity or in both, the two propositions are 'opposed to each other. For eg. the propositions 'All men are mortal' and 'No men are matal are opposed to each other because the two propositions differ in quality. It should be remembered that unless the Subject and the predicate of two propositions are the same, there will be no opposition at all between them.

2. *The different kinds of Opposition:* There are four kinds of opposition, namely, Contrary opposition, Sub-contrary opposition, Sub-altern opposition and



contradictory opposition. The four oppositions are generally represented by a diagram known as the Square of Opposition.

(*a*) *Contrary opposition*: Contraries are two univesal propositions, having the same subject and the same predicate, but differing in quality. e.g. 'All men are mortal' and 'No men are mortal' are contraries. They are A and E propsitions.

Of the true Contraries, if one is true the other is false; if one is false, the other is doubtful. e.g. The proposition 'All men are mortal' is true. Its contrary 'No men are mortal' is false. If one of the two contraries is false, the other may or not be true e.g. The contrary of the false proposition, 'No men are mortal' which is 'All men are mortal' is true. But the Contrary of the false proposition 'All men are honest', namely 'No men are honest' is equally false. Hence we may say, if A is true, E is false, if E is true, A is false, if A is false, E is dubtful and if E is false, A is doubtful.

(*b*) *Sub-contraries*: These are two particular propositions having the same subject and predicate, but differing in quality. They are I and O propositions. e.g. 'Some flowers are red' and 'some flowers are not red' are sub-contrary propositions.

Of the two sub-contraries, if one is false, the other is true, but if one is true, the other is doubtful. The truth of the proposition 'some men are mortal' naturally implies the falsity of its subcontrary 'some men are not mortal'. But sometimes, both may be true; eg. the sub-contraries 'some men are honest' and 'some men are not honest' are both true. So if I is false, O is true, if, O is false, I is true, if I is true, O is doubtful and if, O is true, I is doubtful.

(*c*) Subalterns: These are two propositions having the same subject and predicate, but differing in

quantity only. So these propositions agree in having the same quality. They are A and I, and E and O propositions e.g. The propositions, 'All Kings are rich' and 'some Kings are rich' are subalterns. The same is the case with the propositions, 'No Indians are slaves' and 'some Indians are not slaves'.

Of the Subalterns, if the universal is true, the corresponding particular also is true. This is so because, the particular is after all, a part of its universal. So what is true of the universal will naturally be true of its particular. But, if the universal is false, the particular is doubtful. For eg. though the universal proposition 'No men are honest' is false, its subaltern, 'some men are not honest' is quite true.

Again, of the two subalterns. if the particular is false, the universal is false. This is so because, what is not true of a part of a class can in no way be true of the whole class. For e.g. if it is false to say that 'some men are angels' its subaltern, 'All men are angels' is all the more false. But if the particular is true, the universal is doubtful. e.g. The proposition 'Some flowers are red' is true. But its subaltern 'All flowers are red' is false. If A is true, I is true, if E is true, O is true. If I is true, A is doubtful, if O is true, E is doubtful. If I is false, A is false, if O is false, E is false.

(*d*) Contradictories: Contradictories are two propositions which have the same subject snd the same predicate, but which differ both in quality and in quantity. These are A and O, and E and I propositions. e.g. The contradictory of 'Some students are intelligent' is 'No students are intelligent.'

Of the contradictories if one is true the other is false, and if one is false, the other is true. Both the contradictories cannot be true or false, at the same time

eg. The proposition, 'All men are honest' is false. Its contradictory, 'Some men are not honest' is true. If 'Some books are good' is true, its contradictory 'No books are good' is false. The same holds good with the other contradictories also. If A is true, O is false, If O is true, A is false, if E is true, I is false, if I is true, E is false. If A is false, O is true, if O is false A is true, if E is false I is true; if I is false E is true.

CHAPTER IX

Immediate Inference

1. *Introduction*: Inference is a process of thought which leads from one or more propositions to another necessary proposition, justifiable by the former. An inference may be drawn from either one proposition, or more than one proposition. If the inference is drawn only from one proposition, it is called Immediate Inference. For example from the proposition, 'All men are mortal' we may infer 'Some mortal beings are men.' But if the inference is derived from more than one proposition, the inference is called Mediate inference. Details of this type, we shall see later on. So, inferences are of two kinds, namely, immediate and mediate.

The opposition of propositions gives some scope for inferring the truth or the falsity of the opposites of a given proposition. Since, here, the process is from one proposition alone, some logicians consider this as a kind of immediate inference. But usually, the name immediate inference is given only to those inferences where the procedure is from the truth of a given proposition, to the truth of another. Such processes are called eductions. In eduction, we infer propositions from a

given one taken to be true. The subject and the predicate may be different.

2. *Eductions*: The main eductions are conversion and obversion. The other kinds of eductions, viz. obverted converse, contraposition and Inversion are only the results of combining the main ones.

(*a*) *Conversion*: This is a process of inference, where the subject and the predicate of a given proposition are transposed without changing the meaning. The proposition to be converted is called the convertend. The result is known as the converse. The following are the rules of conversion.

(1) Change the places of the subject and the predicate. (ie from S is P to P is S)

(2) The quality of the converse should be the same as that of the convertend.

(3) If a term is not distributed in the convertend, it should not be distributed in the converse. We may now apply the rules and convert the four kinds of propositions.

Conversion of A: i.e. All S is P. The subject and the predicate should change places. So it will become P is S The quality remains the same. Now P is not distributed in the convertend. So it should not be distributed in the converse. If we convert All S is P into All P is S, P which is not distributed in the original will be distributed in the converse which is against the rule of conversion. So convert 'All S is P' into 'Some P is S'. An 'A' proposition is always converted into an 'I' proposition.

eg. 1. Convertend All S is P. All men are mortal (SAP)

Converse Some P is S. Some mortals are men (PIS)

2. All S is P. All despots are cruel (SAP)
Some P is S. Some cruel persons are despots (PIS)

This Converssion of an 'A' proposition is known as conversion per accidens or conversion by limitation because 'A' is limited into 'I'.

Conversion of E: This is quite simple. Convert E into E The quality remains the same. As both the terms are distributed in E, there is nothing to be bothered about the distribution of terms in the converse.

eg. Convertend. No S is P. No men are angels (SEP)
Converse. No P is S. No angels are men (PES)

Conversion of 'I'. As 'I' distributes no term, the converse should not distribute any term. So the converse should be 'I'.

eg. Convertend. Some S is P. Some books are red. (SIP)
Converse. Some P is S. Some red objects are books (PIS)

The conversion of E and I propositions is called Simple Coversion.

Conversion of O: An O proposition cannot be converted. If at all O is to be converted, the converse should be either O or E to keep up the same quality. But in both cases the subject of the convertend which is undistributed, gets distributed, being the predicate of negative propositions. This is against the rule of conversion. Hence O cannot be converted.

Sometimes an A proposition may be converted into an A proposition. This happens when the predicate of the convertend is taken as a whole. eg. 'All men are rational,' should be converted into 'All rational beings are men' Such cases are exceptions

and strictly an A proposition should be converted only into an I proposition.

A singular proposition may be converted without limitation, if both the terms in the proposition are singular terms. The converse of ' Rama is the tallest boy in this class is 'The tallest boy in this class is Rama.' Such conversions as the above two are cases of simple conversion.

(*b*) *Obversion*: This is a kind of immediate inference in which we draw a conclusion from a given proposition by taking the same subject and the contradictory of the original predicate. The original proposition is called the obvertend and the conclusion is called the obverse.

Rules of Obversion :

(1) The subject of the obverse is the same, but take for the predicate, the condradictory of the original predicate.

(2) Change the quality. (from affirmative to negative and vice versa)

(3) Do not change the quantity, (the obverse of universal is universal and that of particular is particular)

Obversion of A.: The obverse of A is E, for in E the quantity is the same and the quality is different. The contradictory of a term may be taken by adding the prefix 'non' 'not' 'other man' etc to the term. Symbolically the contradictory of S is $\bar{S}$ (non-S) and that of P is $\bar{P}$ (Non-P)

eg. obvertend—All is P. All men are mortal (SAP)
obverse. No S is non P. No men are non-mortal (SEP)

Obversion of E: The obverse of No S is P (SEP) is All S is non P (SA$\bar{P}$)

eg. obvertend. No men are mortal. (SEP)
obverse. All men are non mortal ($SA\bar{P}$)

Obversion of I: The obversion of I gives O by changing the quality, and keeping the quantity the same. So 'Some S is P', when obverted becomes 'Some S is not non P'

eg. obvertend. Some men are liars. (SIP)
obverse. Some men are not non liars ($SO\bar{P}$)

Obversion of O: The obverse of O is I. So 'some S is not P' when obverted gives, 'some S is non P'.

eg. obvertend. Some fruits are not sweet. (SOP)
obverse. Some fruits are nonsweet. ($SI\bar{P}$)

(*c*) *Obverted converse*: This is an inference which has for its subject, the predicate of the original proposition, while the predicate is the contradictory of the original subject. (S – P. ob. c= P--$\bar{S}$). First convert and then obvert the converse. The result is obverted converse.

A. Original. All S is P. All men are mortal (SAP)
Converse. Some P is S. Some mortals are men (PIS)
ob. Converse. Some P. is not non S. Some mortals are not non men. ($PO\bar{S}$)

E. Original. No S is P. No men are perfect. (SEP)
Converse. No P is S. No perfect beings are men (PES)
ob. Converse. All P. is non S. All perfect beings are non men. ($PA\bar{S}$)

I. Some S is P. Some graduates are employed (SIP)
C. Some P is S. Some employed persons are graduates (PIS)
ob. C. Some P is not non S. Some employed persons are not non graduates ($PO\bar{S}$)

O. There is no obverted converse for O proposition because O cannot be converted.

(*d*) *Contraposition*: Here, the subject of the contrapositive is the contradictory of the original predicate. In partial contrapositive the predicate is same as the original subject while in full contrapositive, the pradicate is the contradictory of the original subject (original $S-P$, $P.C.=\bar{P}-S$. $F.C=\bar{P}.\,\bar{S}$.) To get the partial contrapositive first obvert and then convert the given proposition. If the partial contrapositive is obverted again, the result is the full contrapositive.

A. SAP All men are mortal

O. $SE\bar{P}$ No men are non-mortal

C. $\bar{P}ES$ No non-mortals are men (Partial Contrpositive)

O. $\bar{P}A\bar{S}$ All non-mortals are non-men (Full Contrapositive)

E. SEP No men are perfect

O. $SA\bar{P}$ All men are non-perfect

C. $\bar{P}IS$ Some non-perfect beings are men (P. Contra.)

O. $\bar{P}O\bar{S}$ Some non-perfect beings are not non-men (F. C.)

I. There is no contrapositive because when we first obvert SIP, we get SOP and SOP cannot be converted.

O. SOP Some animals are not bipeds

O. $SI\bar{P}$ Some animals are non-bipeds

C. $\bar{P}IS$ Some non-bipeds are animals (P. C.)

O. $\bar{P}O\bar{S}$ Some non-bipeds are not non-animals (F. C.)

(*e*) *Inversion*: This is a kind of immediate inference in which, the subject is the contradictory of the original

subject. In partial inverse, the predicate is the same as the original predicate. But in full inverse, the predicate is the contradictory of the original predicate. $(S - P - P.I. = \bar{S} - P, F.I. = \bar{S} - \bar{P}.)$ The original proposition is known as the invertend and the inferences are known as inverses. Only universal propositions have inverses. To find out the inverses of A, start with obversion and proceed with the alternate use of conversion till a proposition which has for it the contradictory of the original subject as the subject is got. Start with conversion to find out the inverses of E, for that only will yield the inverses.

A. SAP All wise men are good

O. $SE\bar{P}$ No wise men are non good

C. $\bar{P}ES$ No non good persons are wise

O. $\bar{P}A\bar{S}$ All non good persons are non wise

C. $\bar{S}I\bar{P}$ Some non wise men are non good (Full inverse)

O. $\bar{S}OP$ Some non wise men are not good (Partial Inverse)

E. SEP No cows are birds.

C. PES No birds are cows.

O. $PA\bar{S}$ All birds are non cows.

C. $\bar{S}IP$ Some non cows are birds. (Partial Inverse)

O. $\bar{S}O\bar{P}$ Some noncows are not nonbirds. (Full Inverse)

Inversion of I

S I P

| |

O. SOP C. PIS

C. × O. POS

C. ×

There is no inverse for 'I' proposition.

Inversion of O

SOP

O. $SI\bar{P}$ C ×

C. $\bar{P}IS$

O. $\bar{P}O\bar{S}$

C. ×

There is no inverse for 'O' proposition.

3. *Scheme of Education*: The following scheme will be of use in understanding clearly the eductions.

SAP

O. $SE\bar{P}$	Obverse	C. PIS	Converse
C. $\bar{P}ES$	P. Contrapositive	O. $PO\bar{S}$	Ob. Converse
O. $\bar{P}A\bar{S}$	F. Contrapositive		
C. $\bar{S}I\bar{P}$	Full Inverse		
O. $\bar{S}OP$	Partial Inverse		

SEP

O. $SA\bar{P}$	Obverse	C. PES	Converse
C. $\bar{P}IS$	Partial Contrapositive	O. $PA\bar{S}$	Obverted Converse
O. $\bar{P}O\bar{S}$	Full ,,	C. $\bar{S}IP$	Partial Inverse.
		O. $\bar{S}O\bar{P}$	Full Inverse.

SIP

O. $SO\bar{P}$	Obverse	C. PIS	Converse
		O. $PO\bar{S}$	Obverted Converse.

SOP

|

O. $S I \bar{P}$ Obverse

C. $\bar{P} I S$ Partial contrapositive

O. $\bar{P} O \bar{S}$ Full contrapositive.

4. *Non-logical Inferences:* (1) Inference by converse relation. This is a kind of conversion when the subject and the predicate of a proposition are relative terms. e.g. The proposition 'Rama is the husband of Sita' may be converted as 'Sita is the wife of Rama'.

(2) *Material Obversion* is a kind of nonlogical inference in which from a given proposition another proposition is inferred by taking the contrary of the original subject and the predicate.

e.g. (*a*) Knowledge is good.
∴ Ignorance is bad.
(*b*) Warmth is agreeable.
∴ Cold is disagreeable.

(3) *Inference by Added Determinants.*

This is a kind of immediate inference in which from a given proposition, we infer a new proposition by limiting the original subject and the predicate in an identical way, by adding a quality.

e. g. All roses are flowers.
∴ All white roses are white flowers.
(2) A comet is a material body.
∴ A visible comet is a visible material body.

Sometimes the inference will go wrong if the quality added is not applicable to the subject and the predicate in the same way.

e. g. A poet is a man.
∴ A good poet is a good man.

Here the quality 'good' is not applied to 'poet' and 'man' in the same way. A good poet need not be a good man.

(2) An ant is an animal.

∴ A big ant is a big animal.

(3) A cottage is a building.

∴ A huge cottage is a huge building.

These are also false inferences.

(4) *Inference by complex conceptions.*

This is an inference in which the subject and the predicate of a given proposition, are made parts of a more complex conception.

e. g. The horse is an animal.

∴ The head of the horse is the head of an animal.

Here also, as in the former the inference might go wrong if the new complex conception has different meanings in the subject and the predicate.

e. g. (1) All Protestants are Christians.

∴ A majority of protestants is a majority of Christians.

This is wrong because a majority of Protestants can never form a majority of christians.

(2) All Judges are lawyers.

∴ A majority of Judges is a majority of lawyers. (False)

5. *Is Immediate Inference Real Inference?* Mill, Bain and some other logicians are of opinion that immediate inferences are not inferences at all. According to Mill, the immediate inferences we have seen presently, are "inferences improperly so-called". He thinks so because he finds nothing new in these inferences. The inferences merely contain the ideas already present in

the original propositions. Hence Bain says, "In none of these cases, is there inference properly so called, that is to say, a transition from a fact to some different fact. There is merely the transition from one wording to another wording of the same fact". Thus Mill and Bain are of strong opinion that these inferences are not at all inferences. But Bosanquet and some other logicians are against this view. They say that novelty is not the yard-stick of inference. According to them it is necessity that is the basis of inference. The inference should be necessary.

In conclusion, it may be said that Mill and Bain are not correct in their view. The main function of inference is to bring out clearly the meaning of a given proposition. Many things may be hidden in a proposition. Such things are brought to light by immediate inference. So even if the credit of being inferences is denied to educations, they are useful.

Exercises worked out

1. Work out all possible inference from 'Only the faithful are happy.'

Logical form; All happy persons are faithful

S = happy persons; $\bar{S}$ = non happy persons

P = faithful; $\bar{P}$ = non faithful.

The eduction scheme for A is;

SAP

O. SE$\bar{P}$
C. $\bar{P}$ES (P. C.)
O. $\bar{P}$A$\bar{S}$ (F. C.)
C. $\bar{S}$I$\bar{P}$ (F. I.)
O. $\bar{S}$OP (P. I.)

C. PIS
O. PO$\bar{S}$ (ob. C.)

(*a*) Obverse No happy persons are non faithful (SE$\bar{P}$)

(*b*) P. C. No non faithful persons are happy ($\bar{P}$ES)

(*c*) F. C. All non faithful persons are non happy ($\bar{P}$A$\bar{S}$)

(*d*) F. I. Some non happy persons are non faithful ($\bar{S}$I$\bar{P}$)

(*e*) P. I. Some non happy persons are not faithful ($\bar{S}$OP)

(*f*) Converse. Some faithful beings are happy persons (PIS)

(*g*) ob. Converse. Some faithful beings are not non happy persons (PO$\bar{S}$)

(*h*) Contrary. No happy persons are faithful (SEP)

(*i*) Subaltern. Some happy persons are faithful (SIP)

(*j*) Contradictory. Some happy persons are not faithful.

II. Determine the logical relation between the first of the following propositions and each of the rest :—

(*a*) Madrasis alone are progressive.
(*b*) Some non-Madrasis are not progressive.
(*c*) Some non-progressive people are Madrasis.
(*d*) No progressive people are non-Madrasis
(*e*) All Madrasis are not progressive.
(*f*) No non progressive persons are Madrasis.

Madrasis alone are progressive.

L.F. All $\underbrace{\text{progressive persons}}_{S}$ are $\underbrace{\text{Madrasis.}}_{P}$ (SAP)

SAP

O. $SE\bar{P}$	C. PIS
C. $\bar{P}ES$ (P. C.)	O. $PO\bar{S}$. (ob. C.
O. $\bar{P}A\bar{S}$ (F. C.)	
C. $\bar{S}I\bar{P}$ (F. I.)	
O. $\bar{S}OP$ (P. I.)	

Here S = progressive persons – $\bar{S}$ = non-progressive persons, P = Madrasis and $\bar{P}$ = non-Madrasis.

(*b*) Some non-Madrasis are not progressive. $\bar{P}OS$

This is the subaltern of $\bar{P}ES$ which is the partial contrapositive of the original

(*c*) Some non-progressive people are Madrasis. $\bar{S}IP$

This proposition is the subcontrary of $\bar{S}OP$ which is the partial inverse of the original.

(*d*) No progressive people are non-Madrasis. $SE\bar{P}$

This is the obverse of the original.

(*e*) All Madrasis are not progressive.

L. F. Some Madrasis are not progressive. POS

This is the subcontrary of PIS which is the converse of the original.

(*f*) No non-progressive persons are Madrasis. $\bar{S}EP$

This proposition is the subaltern of $\bar{S}OP$ which is the partial inverse of the original.

III. Given, "No unambitious men are successful", what do you infer about the truth or the falsity of the following :—

1. Ambitious men are sometimes successful.
2. Only unsuccessful men are unambitious.
3. Not a few successful men are unambitious.
3. Some ambitious men are not successful.

No unambitions men are successful. SEP

S = unambitious. $\bar{S}$ = non unambitious, i.e. ambitious ; P = successful ; $\bar{P}$ = non successful.

SEP

O. SA$\bar{P}$	C. PES.
C. $\bar{P}$IS. (P. C).	O. PA$\bar{S}$. (ob.c)
O. $\bar{P}$O$\bar{S}$. (F. C).	C. $\bar{S}$IP. (P. I.)
	O. $\bar{S}$O$\bar{P}$. (F. I)

1. Ambitious men are sometimes successful. L.F. some ambitions men are successful. $\bar{S}$IP. This is the partial inverse of the given proposition. So it is true.

2. Only unsuccessful men are unambitious. L. F. All unambitious men are unsuccessful. (SA$\bar{P}$) This is the obverse of the original. So it istrue.

3. Not a few successful men are unambitious. L. F. some successful men are not unambitious. POS.

This is the subaltern of PES which is the converse of the original. The converse PES is true. So its subaltern POS also is true.

4. Some ambitious men are not successful $\bar{S}$OP. This proposition is the sub contrary of $\bar{S}$IP, which is the partial inverse of the original. The partial inverse $\bar{S}$IP is true. So its subaltern S$\bar{O}$P is doubtful.

IV. Given the truth, of the proposition 'All dealers are producers', what can you infer about (1) Non-dealers, (2) producers and (3) non producers.

All dealers are producers. SAP.

(1) non-dealers = $\bar{S}$, (2) Producers = P. non-producers = $\bar{P}$.

SAP

O. $SE\bar{P}$.
× C. $\bar{P}ES$. P. C.
× O. $\bar{P}A\bar{S}$ F. C.
× C. $\bar{S}I\bar{P}$. F. I.
× O. $\bar{S}OP$. P. I.

× C. PIS
× O. $PO\bar{S}$. ob. c.

1. *Non-dealers*

(*a*) Some non-dealers are non-producers $\bar{S}I\bar{P}$.
(Full inverse of the original).

(*b*) Some non-dealers are not producers $SO\bar{P}$.
(Partial inverse of the original)

2. *Producers* :

(*a*) Some producers are dealers PIS.
(Converse of the original)

(*b*) Some producers are not non-dealers $PO\bar{S}$.
(Obverted converse of the original)

3. *Non-producers* :

(*a*) No non-producers are dealers $\bar{P}ES$.
(Partial contrapositive of the original)

(*b*) All non-producers are non-dealers $\bar{P}A\bar{S}$.
(Full contrapositive of the original)

V. *Examine the following* :—

(*a*) All teachers are educated. Therefore all educated persons are teachers. This is the false conversion of an A proposition. The correct converse is 'Some educated persons are teachers.'

(*b*) All South Indians are not businessmen. Therefore all businessmen are not South Indians. Here an O proposition is converted whereas there is actually no converse for an O proposition.

(*c*) War is productive of evil. Therefore peace is productive of good. This is a case of material obversion. It is not logical.

(*d*) A lawyer is a man; therefore a good lawyer is a good man. This inference is known 'as' inference by added determinants. Here it is false because, the quality added namely 'good' is not applied in the same extent to the subject and to the predicate.

(*e*) All English novels are books; therefore a majority of English novels is a majority of books. This immediate inference is known as inference by complex conception. Here the inference is false because a majority of English novels cannot form a majority of books.

CHAPTER X

The Categorical Syllogism

1. *Characteristics*: A mediate inference is an inference drawn from two or more propositions taken together. A syllogism is a form of mediate inference, in which the conclusion is drawn from two propositions taken jointly. It has three propositions, two being premises and the third the conclusion arrived at. For example in the following syllogism:—

All men are mortal
Krishna is a man
∴ Krishna is mortal

the first two are called the premises or the grounds from which the inference is drawn. The third proposition is the conclusion. The inference is made possible from the two premises due to the presence of a middle term or a common term, but for which no syllogistic inference is possible. It is because the inference is drawn through a medium that the inference is called mediate.

In a syllogism, the premises are taken to be true. We are not bothered about the material truth of the premises. The conclusion follows from these two premises taken together and not taken separately. The conclusion should be one that follows necessarily from the premises. Moreover the conclusion cannot be more general than the premises.

The nature of a syllogism depends upon the kinds of propositions which constitute the same. Syllogisms may be either pure or mixed. A pure syllogism is one that is composed of the same kind of propositions. But in a mixed syllogism, more than one kind of proposition is used. For the present, we shall confine ourselves to the study of pure categorical syllogisms, which as said above consist only of categorical propositions.

2. *Structure of the syllogism*: There are three propositions in a syllogism. Two of them are the premises and the third one is the conclusion arrived at from the premises taken jointly. Each proposition has *two* terms. So on the whole there should be six terms. But there are three different terms, and each term repeats twice thereby giving the strength of six terms. The three terms are (1) the minor term, represented by the symbol 'S,' (2) the major term, represented by 'P' and (3) the middle term, represented by 'M.' The subject of the conclusion is always the minor term (S) while the predicate of the conclusion is the major term (P) invariably. The middle term is the term found repeated twice in the premises.

We have seen above that there are three terms and that each term repeats twice, we have also seen that the middle term repeats twice in the premises. Now, the major term is present in the conclusion and also in one of the premises. That premise which contains the major term is called the major premise. The major premise is taken as the first premise in the order of the propositions

in a syllogism. The minor term will be found in one premise, other than in the conclusion. That premise which contains the minor term is known as the minor Premise. So the major premise contains the major term and the middle term, the minor premise contains the minor term and the middle term and the conclusion contains the minor term and the major term. To illustrate this, let us take the following syllogism: —

All Indians are independent.
All Madrasis are Indians.
∴ All Madrasis are independent.

In this syllogism, the minor term, (S) is 'Madrasis' the major term (P) is 'independent' and the middle term (M) is 'Indians'. The syllogism may be reduced in the form of symbols as follows.

M a P
S a M
∴ S a P.

The symbols in the middle here represent the type of the proposition.

3. *General rules of the Syllogism.*

(1) A syllogism must contain only three propositions.

(2) A syllogism must contain only three terms. This of course is a bare necessity for any syllogism. The violation of this rule leads to any one of the two fallacies which are the fallacy of four terms and the fallacy of equivocation.

(*a*) If there are four different terms, the fallacy is that of four terms.

e. g. Pericles ruled Athens
Pericle's wife ruled Pericles.
∴ Pericless's wife ruled Athens.

Here there are four different terms. They are (1) Pericles, (2) ruled Athens, (3) Pericles's wife and (4) ruled Pericles.

(*b*) The fallacy of equivocation is committed if any term is used in more than one meaning, although in appearance there are only three terms. Since any of the three terms may be used in more than one meaning, the fallacies are named after the three terms as ambiguous major, ambiguous minor and ambiguous middle.

e.g. All cases are boxes.
A Judge listens to cases.
∴ A Judge listens to boxes.

Here the middle term 'cases' is used in two meanings, one to mean a case in the court and other a box. So the fallacy of ambiguous middle arises.

e. g. *ambiguous major*.
No courageous creature *flies.*
The eagle is a courageous creature.
∴ The eagle does not *fly*.

e. g. *ambiguous minor*.
No man is made of paper.
All *pages* are men.
∴ No *pages* are made of paper.

(3) The middle term must be distributed at least in one of the premises.

This means that the middle term should be taken as a whole in either of the premises. If only a part of it is compared with the major and the minor terms, the inference will not be correct. It leads to the fallacy of undistributed Middle.

e.g. 1.	All monkeys are animals.	PAM ×
	All men are animals.	SAM ×
∴	All men are monkeys.	SAP

2.	Some animals are bipeds.	×MIP
	All cows are animals.	SAM×
∴	Some cows are bipeds.	∴SIP

4. No term can be distributed in the conclusion, unless it is distributed in the premises. The violation of this rule leads to 'illicit process'. If the minor term is distributed in the conclusion without being distributed in the minor premise, the fallacy of illicit minor is committed. If the major term is distributed in the conclusion without being distributed in the major premise, the fallacy of illicit major is committed. The idea here is that if a term is not taken in its entire denotation in the premises, it is not correct to take the same in its entire denotation in the conclusion.

e.g. Illicit Minor :

	No men are perfect	MEP
	All men are animals	MAS ×
∴	No animals are perfect	√ SEP

Illicit Major :

	All Hindus are Aryans	MAP ×
	No Persians are Hindus	SEM
∴	No Persians are Aryans	SEP √

5. No conclusion can be drawn if both the premises are negative. If both the premises are negative, the *fallacy of two negatives*, is committed. If both the premises are negative, the middle term will have no connection to the major and the minor terms. This being the case, nothing can be inferred. So one premise should be affirmative. The following syllogism commits the fallacy of two negatives.

No bachelor has a wife
He has no wife
He is a bachelor.

6. If one premise is negative, the conclusion must be negative and if the conclusion is negative, one premise must be negative. If one premise is negative, the middle term does not agree with the other term in that proposition and in the other proposition, the middle term agrees with the remaining term. So naturally, in the conclusion the major and the minor terms do not agree with each other. So it becomes negative. The converse of this also should be remembered. If the conclusion is negative, one premise must be negative.

7. If both premises are affirmative, the conclusion will be affirmative and if the conclusion is affirmative both the premises must be affirmative.

If both premises are affirmative, the middle term agrees with both the other terms. So this leads to the affirmation of something between the terms in the conclusion. If the conclusion is affirmative, both premises are affirmative, for if any premise is negative, the conclusion would have been negative.

8. If both premises are particular, no conclusion follows :—

I and O are the two particular propositions. The different ways in which these two propositions can combine as premises are II, IO, OI and OO. The first combination II, commits the fallacy of undistributed middle for 'I' distributes nothing. The second and the third combinations IO and OI distribute only one term in each. This should be the middle term. But one premise being negative in each, the conclusion becomes negative, thereby distributing the predicate i.e. the major term. But there is no scope for distributing the major term in the major premise. So in both cases, the fallacy of illicit major is committed. The last combination with OO as the premises is false because both are negative premises. So, from two particular premises, no conclusion can be drawn.

9. If one premise is particular, the conclusion must be particular. The different ways in which the particular propositions can combine with the universal ones are, AI, IA, AO, OA, EI, IE, EO and OE. The first two AI and IA, allows the distribution of only one term in each and that should be the middle term. If the conclusion is universal the subject will be distributed and as the 'same cannot be distributed in the minor premise the fallacy of illicit minor will be committed.' Let us next take AO and OA. In these, we may distribute two terms each, i e. the subject of A and the predicate of O. One term to be distributed necessarily is the middle term. The remaining one term should be left for the distribution of the major term, as the same is distributed in the conclusion for the conclusion is negative due to a negative premise. So if the conclusion is universal, the subject of the conclusion i.e. the minor term will be distributed in the conclusion and as it cannot be distributed in the minor premise, the fallacy of illicit minor will be committed. Now let us see EI and IE. Here also what is said for AO and OA will hold good. But IE yields no valid conclusion as we shall see later on. The last group EO and OE are invalid as they have both negative premises in each. So if one premise is particular, the conclusion should be particular, i.e. it cannot be universal.

10. From a particular major and a negative minor (i.e. I and E) no conclusion follows :

From I major and E minor, the conclusion will be O. Being negative the conclusion distributes the predicate which is the major term. But as it is not distributed in the major promise, the fallacy of illicit major is committed.

4. *Figure and Mood*: In a syllogism, the middle term can occupy any place in the premises. The middle term may be the subject of the major premise or the

predicate of the major premise. The same thing can happen with regard to the minor premise also. On the whole there are four different forms in which the middle tern can occupy places in the premises. These are known as the four figures. So a figure is the form of a syllogism, which is determined by the position of the middle term. The following are the four figures represented symbolically.

Fig. I	Fig. II	Fig. III	Fig. IV
M P	P M	M P	P M
S M	S M	M S	M S
∴ S P	∴ S P	∴ S M	∴ S P

In the first figure the middle term is the subject of the major premise and the predicate of the minor premise. In the second figure the middle term is the predicate of both the premises. In the third figure, the middle term is the subject of both the premises. In the fourth figure, the middle term is the predicate of the major premise and the subject of the minor premise.

5. *Mood of Syllogism*: Mood is defined as the form of a syllogism which is determined by the quality and the quantity of the propositions. For instance, if all the propositions of a syllogism are 'A' propositions we say that it is of the mood AAA. Any proposition of a syllogism may be any one of the four propositions A. E I O. So a figure will have $4 \times 4 \times = 64$ moods. The four figures will have a total of $64 \times 4 = 256$ moods. Many of these moods do not give valid conclusions. For instance we know that the moods like, EE, II, IO etc. yield no conclusion. So if we restrict the word mood only to those premises which yield valid conclusions, there are only 19 valid moods in all the four figures, taking into consideration only the premises.

6. *The Special Rules of the Four Figures* :

(*a*) *First figure* :

1. The major premise must be universal.
2. The minor premise must be affirmative.

M P
S M
―――
S P.

1. The major premise must be universal: To prove this we have to take the major premise to be particular. If the major premise is particular, the subject which is the middle term is not distributed. So it should be distributed in the minor premise. To do so, the minor premise should be negative for M is the predicate there. Now the conclusion becomes negative and the predicate which is the major term is distributed. The major premise should be affirmative, for already we have taken the minor premise to be negative. So the major term is undistributed in the major premise being the predicate of an affirmative proposition. This leads to the fallacy of illicit major. So the major premise cannot be particular *i.e.* it should be universal.

2. The minor premise must be affirmative: If the minor premise is not affirmative take it to be negative. If the minor premise is negative, the major premise should be affirmative and the conclusion becomes negative. The negative conclusion distributes its predicate, *i.e.* the major term. But as it is not distributed in the major premise being the predicate of an affirmative proposition, the fallacy of illicit major is committed. So the minor premise in Fig. 1 must be affirmative and not negative.

(*b*) *Second Figure* :

1. The major premise must be universal.
2. One premise must be negative.

P M
S M
―――
S P

1. The major premise must be universal: Let us suppose the major premise to be particular and see whether it will be correct. One of the premises should be negative to distribute the middle term. The conclusion becomes negative and P is distributed in the conclusion. But the major premise is particular and so P which is the subject of the same is not distributed. This leads to the fallacy of illicit major.

2. One premise must be negative: Let us suppose both the premises to be affirmative instead of taking one to be negative. The middle term is the predicate of both the premises. So if both the premises are affirmative, the middle term will not be distributed even once. Hence the fallacy of undistributed middle is committed if one premise is not negative.

(*c*) *Third Figure:*

1. The minor premise must be affirmative.
2. The conclusion must be particular.

M P
M S
―――
S P

1. The minor premise must be affirmative: If the minor premise is not affirmative, i.e. if it is negative, the major premise should be affirmative and the conclusion becomes negative. P is distributed in the conclusion and it is not distributed in the major premise. This results in the fallacy of illicit major. So the minor premise must be affirmative, i.e. it cannot be negative.

2. The conclusion must be particular: If the conclusion is universal, S will be distributed in the conclusion. To distribute S in the minor premise, the minor premise must be negative. Now the conclusion becomes

negative. The major premise should be affirmative since the minor premise is negative. P is distributed in the conclusion. But P is not distributed in the major premise. The result is the fallacy of illicit major. So the conclusion must be particular and not universal.

(*d*) *Fourth Figure* :

$$\frac{\begin{array}{c}P\ M\\ M\ S\end{array}}{S\ P}$$

1. If the major premise is affirmative, the minor premise must be universal. This means that when the major premise is affirmative, the minor premise cannot be particular. If the major premise is affirmative, the middle term is not distributed there. In the minor premise, the middle term is the subject. So to distribute it in the minor premise, the minor premise must be universal.

2. If the minor premise is affirmative, the conclusion must be particular. According to this rule, the conclusion must not be universal when the minor premise is affirmative. If the minor premise is affirmative, the minor term is not distributed in the minor premise. But if the conclusion is universal, the minor term will be distributed in the conclusion, without being distributed in the minor premise. The fallacy is that of illicit minor.

3. If any premise is negative, the major premise must be universal.

If any premise is negative the conclusion becomes negative. The negative conclusion distributes the predicate P. So in order to distribute P in the major premise, the major premise must be ununiversal. If not, the fallacy of illicit major will be committed.

Applying the above special rules, we get a total of 19 Valid moods in all the four figures. The Latin

school men in the 13th century invented a set of mnemonic lines for the sake of remembering the valid moods easily. They are given below:—

Barbara, Celarent, Darii, Ferio; Cesare, Camestres, Festino, Baroco: Darapti, Disamis, Datisi, Pelapton; Bocardo, Ferison; Bramantip, Camenes, Dimaris, Fesapo, Fresison.

The first four moods, belong to the first figure, the second four to the second figure, the third six moods to the third figure and the last five moods to the fourth figure.

Here each word has 3 Vowels. The first vowel represents the major premise, the second, the minor premise and the third, the conclusion. For instance *Barbara* stands for the mood AAA; *Celarent* for the mood EAE and so on. In Celarent, the major premise is E, the minor premise is A and the Conclusion is E.

7. *Special characteristics of the four figures*

1. *First figure*: Of all the four figures. Aristotle claimed that the first figure is the only perfect figure. He called the second and third figures imperfect, while he did not recognise the fourth figure at all. The most outstanding characteristic of this figure is that the *Dicturm de omni et nullo* applies directly only to this figure. According to this dicturm of Aristotle, whatever is predicated affirmatively or negatively of a term distributed, may be predicated of everything contained under it in a similar manner. This is just what is done in the first figure and not done in the other figures. Moreover, it is only the first figure which yields all the four kinds of propositions, A,E, I and O. Further the positions of the major and the minor terms in the conclusion are not altered in the premises. P which is the predicate of the conclusion is again the predicate of the major premise.

Similarly S remains the subject in the conclusion as well as in the minor premise.

2. *Second figure*: All the valid moods of the second figure yield only negative conclusions. (E & O.) This is because of the peculiar position the middle term takes in both the premises. The negative nature of the conclusion is objected to by Aristotle by pointing out that it does not enable the advancement of scientific knowledge. We should rather prove what a thing is than what is not. But it may be said that proving what a thing is not, also is useful sometimes. So the utility of the second figure cannot be completely cried down.

3. *Third figure;* The peculiarity of the third figure is that all the conclusions are particular. A particular conclusion is useful in suggesting some possible relation between the minor and the major terms, on which further enquiry may be conducted.

e. g. Ocimum, Mentha and Datura are having medical properties.
Ocimum Mentha and Datura are plants.
∴ Some plants are having medical properties.

4. *Fourth figure*: We have seen that the fourth figure is not recognised by Aristotle. The fourth figure was introduced by Galen. Anyway there is a certain amount of strain and artificiality in the process of the fourth figure. There is no spontaniety in the yielding of the conclusion. Of course the conclusion inferred is true. The position of the terms in the conclusion, is inverted in the premises. Hence there is lack of smoothness and clearness as in the following syllogism.

No quadrupeds are men.
All men are animals.
∴ Some animals are not quadrupeds.

8. *Fundamental, Weakened and Strengthened Moods:* A fundamental mood is a syllogism in which

the major and the minor terms are not distributed in the premises without being distributed in the conclusion and the middle term is distributed only once. In all the four figures there are 15 fundamental moods. The other four are called non-fundamental. They are Darapti, Felapton, Bramantip and Fesapo.

In certain syllogisms, the premises are such that we draw universal conclusions. But if in such cases only particular conclusions are drawn, the syllogisms are called weakened syllogisms. For instance, the conclusion in Barbara is A. There is no harm even if we draw an I conclusion. The five such moods from which we can draw particular conclusions are Barbara, Celarent, Cesare, Camestres and Camenes. Their weakened moods are, Barbari, Celaront, Cesaro, Camestros and Camenos.

In some of the valid moods, even though the conclusion is particular, both the premises are universal. In such cases, there is nothing wrong even if one of the premises is particular. Such syllogisms, in which one premise is unnecessarily stronger than what is required to prove the conclusion, are called strengthened moods. Take for example Darapti.

M A P
M A S
S I P

Here instead of MAP, even if we take MIP, the same conclusion can be drawn and no rule is violated. Felapton, Bramentip etc. are some more of the strengthened moods.

9. *Reduction*

1. *Introduction*: Reduction is the process of changing or transforming the moods of the second, third and fourth figures to the moods of the first figure. But why should the moods be reduced thus? Aristotle

regards only the first figure as the perfect figure. He calls the second and the third figures, imperfect figures. The fourth figure, he does not recognise at all. The fourth figure was introduced by Galen. The primary reason why Aristotle regards the first figure to be perfect is that the *Dictum de omni et nullo* applies directly only to the first figure. Another merit of the first figure is that all the four kinds of propositions AEIO are drawn only in this figure. Further the identity of the positions taken by the minor and the major terms in the premises compared to those in the conclusion, makes the process of thought smooth and clear. Due to all these reasons, Aristotle considered only the first figure to be perfect. So the process of reduction was devised is show that the moods of the other figures could be brought to the moods of the first figure. For any mood inthe first figure is valid according to Aristotle. Reduction also shows the unity between all the different figures since any mood of the imperfect figures can be brought to a mood in the first figure.

2. *Kinds of Reduction*: Reduction is of two kinds, direct or ostensive reduction and indirect reduction.

(*a*) *Direct Reduction:* Direct reduction is the process of transforming the moods of the 2nd, 3rd and 4th figures to the first figure by making some changes. The mnemonic lines contain the clues for reducing the syllogisms of the imperfect figures. The following are the clues exposed.

1. A mood having a certain initial letter should be reduced to a mood in the first figure which also starts by the same letter. So all the moods of the imperfect figures have in common only the initial consonants of the moods of the first figure which are B, C, D and F. So Cesare should be reduced to celarent, Festino to Ferio and so on.

2. The presence of the letter S in the mnemonic line indicates that the preceding proposition should be simply converted. Thus in Cesare, the major premise E should be simply converted.

3. The letter P denotes conversion per accidens of the proposition indicated by the preceding vowel.

4. The letter M denotes metathesis or transformation of the premises *i.e.* the major premise of the given syllogism becomes the minor premise of the new syllogism and the original minor premise becomes the major premise of the new syllogism.

5. The letter K denotes obversion of the preceding proposition. So, KS means first obversion and then conversion. SK on the contrary denotes conversion first and then obversion.

6. The letter C indicates that the same mood cannot be reduced directly. The two such moods are Baroco and Bocardo. To reduce them directly they should be called Faksoko and Doksamosk respectively.

7. The letters S, K or P at the end of a word should be taken to refer to the new conclusion, *i.e.* the new conclusion should be converted or obverted as the case may be.

3. *A few symbolic examples* :

(1) *Second figure*

Camestres	Celarent
PAM	MES
SEM → S → MES →	PAM
∴ SEP	∴ PES
	SEP, by Conversion.

Baroco = Faksoko	Ferio.
PAM → K → $PE\bar{M}$ → S → $\bar{M}EP$	$\bar{M}EP$
SOM————→ K——→ $SI\bar{M}$	$SI\bar{M}$
∴ SOP.	∴ SOP

(2) Third figure.

	Darapti.	Darii.
	MAP	MAP
	MAS → P ————→	SIM
∴	SIP	∴ SIP
	Bocardo = Doksamosk	Darii
	MOP – K – MI$\bar{P}$ – S – $\bar{P}$IM ↓	MAS
	MAS – M	PI$\bar{M}$
∴	SOP	∴ $\bar{P}$IS.
		S. SIP
		K. SOP.

(3) Fourth Figure.

	Bramantip	Barbara.
	PAM	MAS
	MAS	PAM
∴	SIP	∴ PAS
	Concrete examples :—	SIP

(1) Let us reduce the following syllogism directly to the first figure.

	All Kings are rich	PAM
	Some men are not rich	SOM
∴	Some men are not Kings.	∴ SOP

This syllogism is Baroco in figure two. The word to be used for Baroca is Faksoko.

	Faksoko,		—	Ferio.
	PAM	KS		$\bar{M}$EP
	SOM	— K —		SI$\bar{M}$
∴	SOP			SO P

The major premise is to be first obverted and then converted as follows.

All Kings are rich → No Kings are non-rich → No non rich persons are Kings. The minor premise is to be obverted as 'Some men are non-rich'. Now the new syllogism is as follows:—

	No non rich persons are Kings	$\bar{M}EP$
	Some men are non rich	$SI\bar{M}$
∴	Some men are not Kings	∴ SOP

This syllogism is Ferio in figure 1.

2.	Some men are not honest	MOP
	All men are mortal	MAS
∴	Some mortals are not honest	∴ SOP

This syllogism is Bocardo in Fig. 3. The word to be used for reducing Bocardo is Doksamosk.

Doksamosk	Darii
MOP – K – MI$\bar{P}$ – S – $\bar{P}$IM	MAS
MAS ⟶ M	$\bar{P}$IM
∴ SOP	∴ $\bar{P}$IS
	$\bar{S}$IP
	SOP

The major premise is to be first obverted and then converted. The result is 'Some non honest are men.' Since the minor premise is followed by 'm', change the premises. Now the syllogism is as follows :—

	All men are mortal	MAS
	Some non honest are men	$\bar{P}$IM
∴	Some non honest are mortal	$\bar{P}$IS

Since the conclusion is followed by S and K, it has to be converted and then obverted as follows and then we get the original conclusion.

C. Some mortals are non-honest $SI\bar{P}$

O. Some mortals are not honest SOP

The syllogism is Darii in fig. 1.

(*b*) *Indirect Reduction*: Indirect reduction is the process of proving the truth of the given conclusion of a syllogism by constructing a new syllogism in fig. 1 and proving that the contradictory of the given conclusion is false. The falsity of the contradictory of the given conclusion will naturally prove its truth. This method was originally confined only to Baroco and Bocardo. But any mood may be reduced indirectly. The process is as follows :—

Let us reduce Cesare indirectly. Cesare stands thus.

PEM No men are perfect
SAM All angels are perfect
∴ SEP ∴ No angels are men.

Let us suppose the conclusion to be false. If it is false its contradictory will be true. The contradictory of the given couclusion is SIP. *i e.* Some angels are men. With this as one premise and with one of the original premises let us construct a syllogism in the first figure. We have to take this as the new minor premise and the given major premise as the new major premise to get a syllogism in figure 1.

The syllogism is as follows :—

PEM No men are perfect
SIP Some angels are men
∴ SOM ∴ Some angels are not perfect.

The conclusion of the new syllogism SOM, is the contradictory of the given minor premise S a M which is true. So SOM is false. If it is false, one premise must be false. The major premise cannot be false for it is the same as the original given to be true. So the new

minor premise SIP is false. If it is false, its contradictory, SEP, No angels are men, the original conclusion is true.

Note : It must be remembered that the contradictory of the given conclusion should be taken either as a major premise or as a minor premise in such a way that the syllogism formed is in the first figure. Further although, in the above new syllogism, the conclusion happens to be the contradictory of one of the given premises, sometimes the conclusion of the new syllogism may be the contrary of one of the given premises. Lastly, while reducing the moods of the fourth figure, the new conclusion should be converted and this converse should be compared to the given premises. This is so because the new conclusion, as such will not be opposed to the given premises.

We shall reduce one more mood indirectly. Let us take Bramantip in the fourth figure.

PAM All businessmen are hard working.
MAS All hard working men are successful.
∴ SIP ∴ Some successful persons are business men.

Let us suppose the conclusion to be false. If the conclusion is false, its contradictory SEP, No successful persons are business men, should be true. So with this as the minor premise and the original major premise as the major premise, let us construct a new syllogism in figure one as follows :

PAM All business men are hard working.
SEP No successful persons are business men.
∴ SEM ∴ No successful persons are hard working.

C. MES C. No hard working persons are successful.

The new proposition MES, No hard working persons are successful, is the contrary of the original minor premise which is true. So the new proposition is false. If this is false, its convertend, SEM, the new

Conclusion is false. This must be due to the falsity of one premise. The major premise cannot be false for it is the same as the original, given to be true. So the new minor premise SEP, No successful persons are business men, must be false. If it is false, its contradictory SIP, some successful persons are business men, which is the original conclusion, is true.

Exercises: worked out

1. Test the validity of the following syllogisms :—

(*Note* :—In answering such questions, first the syllogism should be written in the proper form. The conclusion will give the minor and the major terms. From this, the premises can be found out. Then write them in the proper order.)

(*a*) Birds have wings; bats are not birds. So bats have no wings. The conclusion of this syllogism is 'bats have no wings.' Its logical form is 'No bats are those which have wings.' Now let us write the syllogism.

	All birds are those which have wings	MAP ×
	No bats are birds	SEM
∴	No bats are those which have wings	SEP √

This syllogism commits the fallacy of illicit major.

(*b*) He must be a South Indian, for he is fond of curds and all South Indians are fond of curds. The syllogism may be properly written in the following way :—

	All South Indians are fond of curds	PAM ×
	He is fond of curds	SAM ×
∴	He is a South Indian	∴ SAP

This syllogism commits the fallacy of undistributed middle.

2. (*a*) Given that O is the major premise of a Valid syllogism, determine its figure and mood. The only data given here is that the major premise is O. If so, the minor premise cannot be E or I. So the minor premise can only be A. The conclusion should be O. The major term is distributed in the conclusion. So the major premise should be MOP. The middle term is not distributed it in the major premise. So to distribute it in the minor promise, it should be taken as MAS and the conclusion is SOP. Let us write it in the order.

MOP
MAS
∴ SOP

This syllogism is Bocardo in figure 3.

(*b*) If the major premise and the conclusion of a valid syllogism agree in quantity but differ in quality determine the mood and the figure.

It is given that the major premise and the conclusion agree in quantity but differ in quality. So the possibilities for them are AE, EA, IO and OI. Of these, the second and the fourth are absurd, for if one premise is negative, the conclusion must be negative. With regard to the third, *i.e.* I as major premise and O as conclusion the minor premise can only be E in which case the syllogism is false. So the only possibility is for the major premise to be A and the conclusion to be E. Since the conclusion is universal negative, both the premises must be universal and one premise should be negative. So the minor premise must be E. The syllogisms are as follows :—

PAM
SEM Camestres
∴ SEP

PAM
MES Camenes
∴ SEP

The first syllogism is camestres in the second figure and the second is Camenes in the fourth figure.

(c) Prove that in a valid syllogism, if the major premise is particular, the minor must be affirmative.

If the major premise is particular, it should be either I or O. The two negative minor premises possible are O and E. But both combinations are false. The first leads to the fallacy of two particular premises while the fallacy of illicit major is committed by the second.

For O as major premise the two possible negative minor premises are O and E. But both combinations commit the fallacy of two negative premises. So the minor premise can only be affirmative when the major premise is particular.

Reduction: Concrete cases of reduction have been given while discussing reduction. So no more such exercises are done here. Sometimes, the student is asked to construct his own syllogism or a syllogism with a certain given conclusion. The first cannot be helped here. The second may be done in the following way.

Question: Construct a syllogism in Bocardo to prove that some students are not intelligent and reduce it directly.

Note:—Since you are asked to prove a certain proposition, treat it as the conclusion. This applies to all such cases. Two terms, the minor term and the major term are given in the conclusion. The other term required is the middle term. Write the symbolic form of Bocardo and write the concrete syllogism, by finding out a suitable middle term as follows:—

Eocardo

MOP Some *who sit for examinations* are not intelligent.

MAS All *who sit for examinations* are students.

∵ SOP Some students are not intelligent.

Now reduce the syllogism yourself.

CHAPTER XI

Mixed Syllogisms

1. *Introduction*: Syllogisms are divided into pure and mixed syllogisms. In a pure syllogism all the constituent propositions are of the same kind. So far, we were dealing with such categorical syllogisms. A mixed syllogism, on the other hand, is one, which contains more than one kind of proposition. Mixed syllogisms are of 3 kinds, viz. (1) Hypothetical, syllogism (2) Disjuntive syllogism and (3) Dilemma.

2. *Hypothetical syllogism*: This is also known as hypothetical — categorical syllogism. A hypothetical syllogism is one which has a hypothetical major premise, categorical minor premise and a catogarical conclusion.

Rules of hypothetical syllogisms:—

1. Affirm the antecedent of the major promise, in the minor premise and affirm the consequent in the conclusion.

2. or Deny the consequent of the major premise in the minor premise and deny the antecedent in the conclusion.

Applying these rules, we get two kinds of valid hypothetical syllogisms. They are (1) Modus Ponens and (2) Modus Tollens.

(1) Modus Ponens: If the antecedent of the major premise is affirmed in the minor premise and if the consequent is affirmed in the conclusion, the syllogism is called Modus Ponens or constructive hypothetical syllogism.

e.g. If it rains, the ground will be wet
It has rained
∴ The ground is wet.

The other forms which this mood can assume are symbolically represented as follows :—

(*a*) If A is B, C is not D.
A is B
∴ C is not D.

(*b*) If A is not B, C is D.
A is not B
∴ C is D.

(*c*) If A is not B, C is not D.
A is not B.
∴ C is not D.

(2) *Modus Tollens* : If we follow the second rule, the result is Modus Tollens or a destructive hypothetical syllogism. This is called destructive because, the consequent of the major premise is denied in the minor premise

e.g. If a man takes Poison, he will die.
He is not dead.
∴ He has not taken poison.

Other forms in symbols,

(*a*) If A is B, C is not D.
C is D
∴ A is not B.

(*b*) If A is not B, C is D.
C is not D
∴ A is B.

(*c*) If A is not B, C is not D.
C is D
∴ A is B.

Fallacies : If the above two rules are violated, two fallacies are committed. They are (1) the fallacy of denying the antecedent and (2) the fallacy of affirming the consequent.

(1) The fallacy of denying the antecedent : The rule of the hypothetical syllogism, permits only the affirmation of the antecedent. If the antecedent is denied, on the contrary, the fallacy of denying the antecedent is committed.

e.g. If A is B, C is D
A is not B
∴ C is not D.

If it rains, the ground will be wet
It has not rained
∴ The ground is not wet.

Proof: The affirmation of the antecedent leads to the affirmation of the consequent. But by denying the antecedent, it is wrong to deny the consequent. The antecedent and the consequent are of the nature of cause and effect. If a certain cause is absent, we cannot conclude that the effect also will be absent for the same effect may be produced by other causes. In the above example, it is wrong to argue that the ground is not wet, because it has not rained. The ground may become wet due to other reasons such as flood, sprinkling of water etc. This proves the first rule.

(2) The fallacy of affirming the consequent: According to the second rule of hypothetical syllogisms, the consequent of the major premise should be denied in the minor premise. If, on the contrary, the consequent of the major premise is affirmed in the minor premise, the fallacy of affirming the consequent is committed.

e.g. If A is B, C is D
C is D
∴ A is B

If a man takes poison, he will die
This man is dead
∴ This man has taken poison

Proof: The affirmation of the consequent of the major premise in the minor premise is wrong. If a certain effect is absent, we may conclude that its cause also is absent. But if the effect is present, we cannot argue that a certain cause should be present because the

same effect may be produced by other causes. In the above example, for instance, it is argued that a certain person must have taken poison for he is dead. No doubt, if a man takes poison, he will die. This does not mean that, if a person is dead, he must have taken poison, for death may be produced by other causes like disease, old age etc. This is the proof of the second rule.

Reduction to Categorical Form: Hypothetical syllogisms which commit fallacies may here be reduced to categorical syllogisms to see if fallacies are committed in the latter.

(1) Fallacy of denying the antecedent.

If the monsoon is late, the crops will suffer.
The monsoon is not late.
∴ The crops will not suffer.

Categorical form.
All cases of the monsoon being late are cases of the crop suffering.
This case is not one of the monsoon being late.
∴ This case is not one of the crop suffering.

MAP ×
SEM
∴ $S\overline{EP}$ ✓

This syllogism commits the fallacy of illicit major. So any hypothetical syllogism which commits the fallacy of denying the antecedent, when reduced to categorical form commits the fallacy of illicit major.

(2) Fallacy of affirming to consequent.

e. g. If it rains, the ground will be wet.
The ground is wet.
∴ It has rained.

Categorical form.
All cases of raining are cases of the ground being wet.

This case is one of the ground being wet.
∴ This case is one of raining.

PAM
SAM
∴ SAP.

This syllogism commits the fallacy of undistributed middle. The same is the case with any hypothetical syllogism which commits the fallacy of affirming the consequent when reduced to categorical form.

Disjunctive syllogism: A disjunctive syllogism is a mixed syllogism in which the major premise is a disjunctive proposition and the other two propositions are categorical. A disjunctive proposition is a conditional proposition which gives two or more alternatives. It is usually of the form, Either A is B or C is D. In a disjunctive syllogism, the minor premise affirms or denies any one of the alternatives.

For a proper disjunctive syllogism, the alternatives in the major premise should be exclusive and exhaustive. This means that each alternative should exclude the other. The alternatives taken together should leave nothing behind. Under the above conditions, we get two moods. They are (1) Modus ponendo tollens, and (2) Modus tollendo ponens.

(1) Modus Ponendo Tollens.

If any alternative of the major premise is affirmed in the minor premise and if the other is denied in the conclusion, the syllogism is called modus ponendo tollens.

e.g. Either he is good or he is bad.
He is good.
∴ He is not bad.

(2) Modus tellendo ponens. This is a form of disjunctive syllogism in which any alternative of the

major premise is denied in the minor premise and the other is affirmed in the conclusion.

e g. Propositions are either affirmative or negative.
This proposition is not affirmative.
∴ This proposition is negative.

Some logicians do not recognise modus ponendo tollens. According to them, the alternatives of a disjunctive proposition need not be mutually exclusive. From this point of view modus ponendo tollens is apt to be wrong. For e.g. the syllogism,

Either he is cruel or he is a soldier,
He is cruel,
∴ He is not a soldier.

is not sound because he may be both a cruel person and a soldier. But it should be remembered that a proper disjunction necessitates exclusive alternatives. So the above view is not quite true.

The fallacy usually committed in disjunctive syllogism is the fallacy of improper disjunction. If the alternatives of the major premise are not exclusive and exhaustive this fallacy arises.

e.g. Either he is rich or he is intelligent
He is rich
∴ He is not intelligent.

This commits the fallacy of improper disjunction.

4. *Dilemma:* A dilemma is a mixed syllogism with a compound hypothetical major premise, disjunctive minor premise and either a disjunctive or a categorical conclusion A compound hypothetical proposition is one in which two hypothetical propositions are joined together. Since the major premise is composed of hypothetical propositions, as in the case of hypothetical syllogisms, here, either the two antecedents of the major premise are affirmed or the two consequents are denied in the minor premise.. If the antecedents are affirmed in

the minor premise, the dilemma is called a *constructive dilemma*. If the consequents of the major premise are denied in the minor premise, the dilemma is called a *destructive dilemma*. The minor premise of a dilemma is a disjunctive proposition because it either affirms the two antecedents or denies the two consequents. If the conclusion of a dilemma is a disjunctive proposition, the dilemma is called a *complex dilemma*, if it is categorical, the dilemma is called a *simple dilemma*. So there are four kinds of dilemmas. They are (1) Complex Constructive, (2) Complex Destructive, (3) Simple Constructive and (4) Simple Destructive.

(1) Complex Constructive:

If A is B, C is D and if E is F, G is H
Either A is B or E is F
∴ Either C is D or G is H

If you act justly, men will hate you; and if you act unjustly gods will hate you
Either you act justly or act unjustly
∴ Either men will hate you or gods will hate you.

Here the antecedents of the major premise are affirmed in the minor premise and the conclusion is a disjuntive proposition.

(2) Complex Destructive:

If A is B, C is D and if E is F, G is H
Either C is not D or G is not H
∴ Either A is not B or E is not F

If a man is dutiful, he will obey orders and if he is intelligent, he will understand them
Either he does not obey orders or he does not understand them
∴ Either he is not dutiful or he is not intelligent.

(3) Simple constructive :

If A is B, C is D and E is F, C is D
Either A is B or E is F
∴ C is D

If a man acts according to his conscience, he will be criticised and if he follows the way of others, he will be criticised.

Either a man acts according to his conscience or he follows the way of others.
∴ In any case he will be criticised.

(4) Simple Destructive :

If A is B, C is D and if A is B, E is F.
Either C is not D or E is not F.
∴ A is not B.

If a body moves, it must move when it is or where it is not.
But a body moves neither where it is nor where it is not.
∴ A body cannot move at all.

In spite of the pretty form which dilemma assumes, it is materially true, rarely. There are 3 ways of criticising a dilemma.

(1) Escaping between the horns of a dilemma.

This consists in pointing out that the alternatives given by a dilemma are not exhaustive and that a third alternative is possible. Let us examine the following dilemma.

If you join the army you will be killed by the enemies and if you join the navy you will be drowned in in the sea.

Either you join the army or the navy.
In any case you will be killed.

Here, the two alternatives given in the minor premise are not the only alternatives. You may join

any other service. This method of meeting a dilemma is known as escaping between the horns of a dilemma. This is one of the reasons why a dilemma is very often false.

(2) Taking a dilemma by the horns.

This is the name given to the process of meeting a dilemma by showing that the consequents of the major premise do not follow from the respective antecedents. In many of the dilemmas, there is no necessary connection between the antecedents and the consequents

e. g If you act justly men will hate you and if you act unjustly gods will hate you.
Either you act justly or act unjustly.
∴ Either men will hate you or gods will hate you.

Let us examine the major premise of the above dilemma. The first part of the premise is 'if you act justly, men will hate you' It is not necessary that men will hate you if you act justly. The consequent does not necessarily follow from the antecedent. The other consequent of the major premise necessarily follows from its antecedent. So the above dilemma may be taken only by one horn. If both the consequents are such that they do not follow from their antecedents the dilemma may be taken by both the horns. This false nature of the major premise is another reason why a dilemma very often becomes fallacious.

(3) *Rebutting a dilemma:* This consists in meeting a dilemma by constructing a counter dilemma and proving the opposite of the original conclusion. The consequents of the major premise should be transposed and their quality should be changed. This should be taken as the major premise of the new syllogism.

e.g. If A is B, C is D and if E is F, G is H
Either A is B or E is F
∴ Either C is D or G is H

The rebutted forms of this dilemma is ;
If A is B, G is not H and if E is F, C is not D.
Either A is B, or E is F
∴ Either G is not H or C is not D.

(1) If the books are in conformity with the Koran, they are superfluous and if they are not in conformity with the Koran, they are pernicious.

Either books are in conformity with the Koran or not.
∴ Either they are superfluous or they are pernicious.

Rebutted, it stands thus :

If the books are in conformity with the Koran, they are not pernicious and if they are not in conformity, they are not superfluous.

Either books are in conformity with the Koran or not.
∴ Either books are not pernicious or they are not superfluous.

5. *Categorical and conditional Propositions and arguments* : A categorical proposition is the unconditional statement of the relation between the subject and the predicate terms. The predicate is either affirmed or denied of the subject without any condition. The subject may be taken either wholly or partly. Thus on the basis of quality and quantity, we get four kinds of categorical propositions A, E, I & O.

Of conditional propositions let us first see the nature of hypothetical propositions. Some logicians are of opinion that like categorical propositions, hypothetical propositions also have quality and that the quality of the hypothetical proposition depends upon the quality of the Consequent. Some others say that it is not quite correct to speak of any quality for the hypothetical propositions. A real hypothetical proposition is a

conditional proposition which gives an antecedent and a consequent, which necessarily follows from the antecedent. The quality of a categorical proposition is brought out by the copula. Distintions of quantity also cannot be ascribed to hypothetical propositions.

According to some logicians, the distinction between categorical and hypothetical propositions is only formal. They think, the two are only different forms or ways of expressing the same thought and as such they do not differ essentially. For e.g the categorical proposition. 'All hard working persons are successful' can be changed into a hypothetical proposition 'If one is hard working, he is successful'. Against this view, some other logicians hold that categorical and hypothetical propositions are entirely different. Any categorical proposition is assertive and unconditional. But a hypothetical proposition is purely conditional. Both views are not quite correct. Some categorical propositions are not really unconditional. The condition is clearly implied in them. Such propositions are called generic universal propositions. For e.g, the categorical proposition, 'All men are mortal' really means; 'If man, then mortal'. But other universal propositions are arrived at by a process of enumeration. They are unconditional. So the difference between hypothetical and categorical propositions is one of degree.

A disjunctive proposition is one which presents the possible alternatives of a system. e.g. Either A is B, or C is D Disjunctive propositions do not possess quality and quantity. Even if the alternatives are negative, the proposition is not negative. A valid disjunctive proposition must be such that, the alternatives should be mutually exclusive and they should be exhaustive.

Some logicians point out that a disjunctive proposition is the result of connecting many hypothetical

propositions. Though there is some truth in this, it is to be remembered that the disjunctive represents a higher realm of thought than the hypothetical. In fact, the categorical, the hypothetical and the disjunctive propositions represent three successive stages in the evolution of knowledge.

With regard to the arguments, we have seen that a hypothetical syllogism is reducible to the categorical form. Syllogisms which commit fallacies in the hypothetical commit fallacies when reduced to the categorical syllogisms. This shows that truth is the same in any kind of argument. But, categorieal syllogisms are denotative in nature, while hypothetical syllogisms refer to the connotative aspect of truth. Any way these arguments reveal the different aspects of thinking.

Exercises worked out :

Express the following arguments in the logical form and examine their validity :—

(1) If a country is prosperous, the people will be loyal. This country must be prosperous because its people are loyal.

L. F. If a country is prosperous, the people will be loyal

The people of this country are loyal

∴ The country is prosperous

This is a hypothetical syllogism. If commits the fallacy of affirming the consequent.

(2) If the monsoon is veɹy late, the crops will suffer. This year we expect good crops, as the monsoon was not late.

L. F. If the monsoon is very late, the crops will suffer.

The monsoon is not late.

∴ This year, the crops will not suffer.

This is a hypothetical syllogism. It commits the fallacy of denying the antecedent.

(3) If all men were capable of perfection, some would have attained it but none having done so, none are capable of it.

L F. If all men were capable of perfection, some would have attained it.

No one has attained perfection.

∴ No one is capable of perfection.

This is a hypothetical syllogism. The consequent is denied in the minor premise. But in the minor premise, something more than what is given in the consequent is denied. Hence the conclusion becomes false. The syllogism is thus invalid.

(4) He is either intelligent or hard working. But he is intelligent. So he is not hard working.

L F. He is either intelligent or hard working.

He is intelligent

∴ He is not hardworking.

This is a disjunctive syllogism. It is not correct because the alternatives of the major premise are not exclusive He may be both intelligent and hardworking,

(5) If a pupil is fond of learning, he needs no stimulus and if he dislikes learning, no stimuluf would be of any avail. He is either fond of learning or he dislikes it. So stimulus is either needless or of no avail.

L. F. If a pupil is fond of learning, he needs no stimulus and if he dislikes learning, no stimulus would be of any avail.

Either he is fond of learning or he dislikes it.

∴ Either he needs no stimulus or no stimulus will be of no avail

This is a complex constructive dilemma. It may be rebutted (The student may himself do this as an exercise)

This dilemma may be met also by taking it by the horns. The consequents of the major premise do not follow necessarily from their respective antecedents. Whether a pupil is fond of learning or not, stimulus is of real use.

CHAPTER XII

Abridged and Conjoined Syllogisms.

1. *Enthymeme:* We have seen that a syllogism has three propositions. In ordinary speech no one taiks in terms of syllogisms. To express condolence at the death of a person, you will not use a syllogism like this; 'All men are mortal', he is a man; Therefore he died'. Rather, a sentence of consolation, 'After all, all men are mortal' is much more graceful and sane. Although in the latter, only one proposition is given, it can be expanded into the form of a syllogism as the former. Such incomplete syllogisms where all the propositions are not expressed, are called enthymemes. So an enthymeme is an abridged syllogism.

Enthymemes are of four orders:

(1) Enthymeme of the first order. If the major premise of a syllogism is not expressed, it is an enthymeme of the first order.

e.g. You are honest because you are wise
i.e. All wise persons are honest
You are a wise person
∴ You are honest.

(2) Enthyme of the Second order. This name is given to a syllogism in which the minor premise is omitted. e.g. Socrates is mortal for all men are mortal.

i.e. All men are mortal
Socrates is a man
∴ Socrates is mortal.

(3) Enthymeme of the third order. If the conclusion of a syllogism is omitted, it is an enthymeme of the 3rd order. e.g. All roses are fragrant and this is a rose.

i.e. All roses are fragrant
This is a rose
∴ This is fragrant.

(4) Enthymeme of the fourth order. If only one proposition is given and if it has a full syllogistic force, it is called an enthymeme of the fourth order. For example if you refer to a happy person and say (after all wise persons are happy) it means,

All wise persons are happy.
He is a wise person.
∴ He is happy.

II. *Poly-syllogism* : A poly-syllogism is a chain of syllogistic reasoning. If two or more syllogisms are connected together, it is called a chain or a train of syllogistic reasoning. In apoly-syllogism, the conclusion of one syllogism becomes a premise of another syllogism. The syllogism whose conclusion becomes a premise of another syllogism is called *prosyllogism* in relation to the latter The syllogism whose one premise is the conclusion of another syllogism is called an *episyllogism* in relation to the other.

e.g. (1) All C is D
All A is C
∴ All A is D
(2) All D is E
All A is D
∴ All A is E
(3) All E is F
All A is E
∴ All A is F

Here the first syllogism is a prosyllogism in relation to the second and the second is an episyllogism in

relation to the first. Similarly the second is a prosyllogism in relation to the third and the third is an episyllogism in relation to the second. It may also be added here that the second is a prosyllogism in relation to the third while it is an episyllogism in relation to the first. If in a poly-syllogism, the syllogisms proceed from pro-syllogisms to episyllogisms, it is called *progressive*. The above given poly-syllogism is a progressive one.

If, on the other hand, the train of reasoning starts with an episyllogism and passes on to a pro-syllogism, it is called *regressive*.

e.g. (1) All A is F
∵ All E is F and
All A is E

(2) All A is E
∵ All D is E and
All A is D

(3) All A is D
∵ All C is D and
All A is C.

Here the first syllogism is an episyllogism in relation to the second because a premise of the first becomes the conclusion of the second, 'All A is E.' The second is an episyllogism in relation to the third. But the second is a pro-syllogism in relation to the first. So here the process is from episyllogism to pro-syllogism.

III. *Sorites*: A sorites is an abridged progressive chain of syllogistic reasoning in which all the conclusions except the last are suppressed. So in a sorites, all the conclusions of the pro-syllogisms and the episyllogisms are suppressed except the final conclusion. When expanded, the suppressed conclusions either become the major or the minor premise of the next episyllogism. The sorites in which the suppressed conclusions of the pro-syllogisms become the minor premises of the corresponding episyllo-

gisms is called an *Aristotelian sorites.* But the sorites in which the suppressed conclusions of the pro-syllogisms become the major premises of the corresponding episyllogisms, is called *Goclenian Sorites.* These are the two kinds of sorites. Let us see them indetail now.

(1) Aristotelian Sorites

All A is B,
All B is C
All C is D
All D is E
All E is F
∴ All A is F

When a sorites is expanded all the syllogisms should be in the first figure. So when the Aristotelian sorites is expanded take the second proposition as the major premise and the first as the minor premise as follows.

(1) All B is C
All A is B
∴ All A is C

(2) All A is D
All A is C
∴ All A is D

(3) All D is E
All A is D
∴ All A is E

(4) All E is F
All A is E
∴ All A is F

As is seen above, when the Aristotelian sorites is expanded the consclusions of the prosyllogisms become the minor premises of the corresponding episyllogisms.

(2) Goclenian Sorites.

All A is B
All C is A
All D is C
All F is E

All F is B

This may be expanded as follows:—

(1) All A is B
All C is A
∴ All C is B

(2) All C is B
All D is C
∴ All D is B

(3) All D is B
All E is D
∴ All E is B

(4) All E is B
All F is F
∴ All F is B

When the goclenian sorites is expanded the suppressed conclusions of the pro-syllogisms become the major premises of the corresponding episyllogisms.

The following are the differences between Aristotelian and Goclenian sorites :—

(1) In the Aristotelian sorites, the first premise is a minor premise and all other premises are major premises. But in the Goclenian sorites, the first premise is a major premise and all the other premises are minor premises.

(2) In the Aristotelian sorites, the suppressed conclusions of the pro-syllogisms form the minor premises of the corresponding episyllogisms. But in the Goclenian sorites, the suppressed conclusions become the major premises of the corresponding episyllogisms.

(3) In the Aristotelian sorites, the predicate of the last premise is the major term. But in the Goclenian sorites, the major term is the predicate of the first premise.

(4) In the Aristotelian sorites, the subject of the first proposition is the minor term while in the Goclenian sorites, the minor term is the subject of the last premise.

Rules of sorites :

1. Only one premise can be negative. In the Aristotelian sorites only the last premise can be negative while in the Goclenian only the first can be negative.

More than one premise cannot be negative in any sorites. A negative premise will yield a negative conclusion which forms a premise of the next episyllogism.

This process will lead to a stage where there are two negative premises. So only one premise can be negative.

The negative premise can be only the last in the Aristotelian sorites. If any other premise is negative, the conclusion becomes negative and the negative conclusion forms the minor premise of the next episyllogism. The syllogism being in the first figure, the minor premise cannot be negative. The last premise can be negative because, the conclusion will not form the minor premise of another syllogism.

In the Goclenian sorites only the first Premise can be negative. No other premise can be negative because all of them are minor premises of syllogisms in the first figure when the sorites is expanded. The first premise can be negative, for it is only a major premise.

2. Only one premise can be particular. In the Aristotelian sorites only the first and in the Goclenian sorites only the last premise can be particular.

In both the sorites, only one premise can be particular. If two premises are particular, when the sorites is expanded, at one stage, the fallacy of two particular premises will arise.

In the Aristotelian sorites only the first premise can be particular. No other premise can be particular because all the other premises are major premises of syllogisms in the first figure when the sorites is expanded. But according to the special rule of the first figure, the major premise must be universal. The first premise can be particular because it is a minor premise and all the suppressed conclusions form the minor premises. So only the first premise can be particular.

In the Coclenian sorites only the last can be particular. The first premise in this sorites cannot be particular because it is a major premise. If any other premise except the last is particular, when the sorites

is expanded, the conclusion becomes particular and this particular conclusion forms the major premise of the next episyllogism. This violates the rule of the first figure. The last premise can be particular because, its conclusion does not form the major premise of any other syllogism.

IV. *Epicheirema*: An epicheirema is a condensed regressive train of reasoning in which one of the premises of each prosyllogism is omitted. If one of the premises is proved by an enthymeme, the epicheirema is called *single*. On the other hand, if both the premises are proved by enthymemes, the epicheirema is called *double*.

(1) Single Epicheirema.

e.g. All men are mortal
All Indians are men for all Indians are rational
∴ All Indians are mortal

This epicheirema is single because only the minor premise is proved by an enthymeme. It may be expanded thus.

(1) All men are mortal
All Indians are men
∴ All Indians are mortal.

(2) All rational being are men
All Indians are rational
∴ All Indians are men.

(3) Double Epicheirema
e.g. All men are mortal because they are animals.
All Indians are men because they are rational.
∴ All Indians are mortal.

Here both the premises are proved by enthymemes. It may be expanded this :

(1) All men are mortal
All Indians are men
∴ All Indians are mortal.

(2) All animals are mortal
All men are animals
∴ All men are mortal.

(3) All rational beings are men
All Indians are rational
∴ All Indians are men.

Exercises worked out

I. Express the following enthymemes in their syllogistic form and examine them.

(1) All grasses have parallel-veined leaves and so has the bamboo.

L. F. All grasses are things which have parallel-veined leaves.
Bamboo is a thing which has parallel-veined leaves.
∴ Bomboo is a grass

This is an enthymeme of the third order. When expanded, the syllogism commits the fallacy of undistributed middle.

(2) Idiots cannot be men for men are rational.

L. F. All men are rational
No idiots are rational
∴ No idiots are men

This is an enthymeme of the second order. Though the syllogism appears to be correct, it is not really so. If involves be fallacy of ambiguous middle.

(3) He cannot be a gentleman, for no gentleman would do such a thing.

L. F. No gentlemen are those who do such a thing.
He is a person who has done such a thing.
∴ He is not a gentleman

This is an enthymeme of the second order. The syllogism is correct and it is cesare in the second figure.

II. Examine the following arguments :

(1) All thieves are dishonest; all dishonest persons are immoral: some immoral persons are not punished: therefore some thieves are not punished.

This is an Aristotelian Sorites. It may be expanded thus :—

(i) All dishonest persons are immoral.
All theives are dishonest
∴ All thieves are immoral

(ii) Some immoral persons are not punished.
All thieves are immoral
∴ Some thieves are not punished.

Here, in the second syllogism, the fallacy of undistributed middle arises. This results from the violation of the rule which says that in the Aristotelian sorites only the first premise can be particular.

(2) An animal is a substance; A quadruped is an animal; Man is not a quadruped; therefore Man is not a substance.

The given one is a Goclenian Sorites and it may be expanded thus :—

(i) All animals are substances
All quadrupeds are animals
∴ All quadrupeds are substances

(ii) All quadruped are substances
No men are quadrupeds
∴ No men are substances

The second syllogism involves the fallacy of illicit major. This is due to the violation of the rule which states that in the Goclenian sorites only the first premise may be negative.

CHAPTER XIII

1. *Mills Criticism of syllogisms*: Mill raises two criticisms against syllogisms. The contention of Aristotle is that the only type of mediate inference is the categorical syllogism. Even in the categorical syllogisms, he recognises only the first figure. The following are the two criticisms which Mill has levelled against Aristotle's view of syllogisms.

(1) The first charge is that the syllogism involves the fallacy of petitio principii.

The fallacy of petitio principii consists in assuming the conclusion as one of the premises. A valid syllogism in the first figure should have a universal major premise. This universal major premise is in turn proved by the conclusion. For example, in the following syllogism,

All men are mortal
Socrates is a man
∴ Socrates is mortal

the major premise 'All men are mortal' is universal. The conclusion 'socrates is mortal' serves only to establish the truth of the major premise. The conclusion, in other words, is assumed in the major premise.

(2) Secondly, Mill points out that since the syllogism gives no new knowledge, it is of no value. The conclusion merely gives something which is already present in the universal premise. If the conclusion gives nothing new, or nothing more than the contents of the premise, what is its value in the advancement of knowledge?

The first criticism is wrongly based. It is based on the notion that a universal proposition is merely the summing up of particular instances. But this is not quite true. A universal proposition is not the result of counting all the particular instances. For instance the

statement 'All men are mortal' is not arrived at after seeing all men dying. But such a universal proposition is made after analysing a few cases. This shows that a universal proposition covers not only the observed instances, but the unobserved cases as well. This being the nature of a universal proposition, there is no point in saying that the conclusion is assumed in the universal premise.

The second charge raised by Mill cuts at the very root of inference. Mill holds that there is nothing new or novel in the conclusion. If the conclusion contains something absolutely new, the conclusion will be unrelated to the premises. Where there is such disparity in the essence between the premises and the conclusion, it ceases to be inference. At the same time, if the conclusion merely states something that is already present in the premises, the conclusion contains nothing new and is hence useless. This is called 'the paradox of inference'. But the conclusion is neither a blunt statement of merely what is contained in the premises nor is it entirely new and unrelated to the premises. The conclusion gives something new Further novelty is not the criteriion of inference. The conclusion should rather be an essential and a necessary one than being novel.

2. *Non-Syllogistic Inferences:* There are mediate inferences which although are valid, cannot be expressed in syllogistic form. They are (1) Relational Arguments and (2) *afortiori* argument.

(1) Relational Arguments

Sometimes we make certain inferences, based on the relation between things. E. g. if we know that A is equal to B and that B is equal to C, we can validly infer that A is equal to C. Such inferences are ʌalled relational arguments or systematic deductions.

e.g. (*a*) × is two inches taller than Y
Y is two inches taller than Z
∴ × is four inches taller than Z

(*b*) A is the father of B
B is are father of C
∴ A is the grand father of C.

2. *A fortiori* arguments: This consists in concluding that a certain proposition should be more true, on the basis of the grounds which support a previous statement. The phrase 'a fortiori' in latin means 'from yet firmer ground' e.g. If it is wrong to kill animals for food, it follows by a stronger reason that animal sacrifice is wrong.

CHAPTER XIV

Fallacies in Deductive Reasoning.

1. *Introduction*: Logic is the science which deals with the principles of valid thinking. So logic gives a number of rules which aid valid thinking. If any rule is violated, a fallacy is committed. A fallacy, therefore, is the result of a violation of any of the rules and principles of logic.

2. *Classification of Fallacies*: In classifying fallacies, we adhere to the classification given by Creighton. Creighton divides fallacies first into *errors in interpretation* and *fallacies in reasoning*. The fallacies in reasoning are again divided into *formal* and *material fallacies.* Material fallacies are further divided into *fallacies of equivocation* and *fallacies of presumption.*

3. *Errors of Interpretation*

(*a*) *Illogical Eduction*: The two basic educts are conversion and obversion. So illogical eduction refers to illogical conversion and obversion. (For further details, refer to the respective chapter)

(*b*) *Amphiboly*: This fallacy consists in the ambiguous construction of a proposition. Such a proposition will yield more than one meaning. e.g. Alexander Darius will conquer. This statement means either, Alexander will conquer Darius or Darius will conquer Alexander. Similarly, the statement, 'wanted a teacher who can teach Hindi for a month' also is ambiguous. Other examples 'The Duke yet lives that Henry shall depose'; 'For sale,; a Newfoundland dog, will eat anything, very fond of children.'

(*c*) *Fallacy of Accent*: If in a sentence, the accent is placed on a wrong word, this fallacy arises. e.g. Thou shall not bear false witness against they neighbour. The actual meaning of this statement may be altered by placing the emphasis on the word 'against.' Then it will mean that one can bear false witness in favour of his neighbour. If on the other hand, emphasis in placed on the word 'neighbour,' the statement may be taken to mean that one can bear false witness against any one who is not a neighbour.

4. *Fallacies in Reasoning*

(*a*) *Formal Fallacies*, are fallacies which result from the violation of the rules of inference. As we have already treated them in detail, only their names are given below. (1) Four terms (2) Undistributed middle (3) Illicit processes (4) Negative premises (5) Particular premises (6) Denying the antecedent (7) Affirming the consequent and (8) Improper disjunction.

(*b*) *Material Fallacies*: Truth does not depend on formal correctness alone. Sometimes though an argument is correct in its form, the contents may be defective. Material fallacies arise from such incorrect matter in arguments. This may happen either due to the use of ambiguous use of terms or due to the assuming of the conclusion in the premises. These are called the fallacies of Equivocation and Presumption respectively.

(*a*) *Fallacies of Equivocation:* (1) Fallacy of Figure of Speech This arises in thinking that words which are similar in form have the same meaning. e g. what is seen is visible; what is heard is audible, So; what is desired is desirable. This is wrong because though what is seen is visible and what is heard is audible, what is desired is seldom desirable The word desirable does not mean, 'that which is desired' but it means that which 'we ought' to desire. Words which are similar in form very often differ widely in their meanings, e.g. Project—projector; dictate-dictator etc.

(2) *Fallacy of composition:* This consists in passing from something which is true of a class distributively to something true of that class collectively. For instance it is true that each boy in a class of 100 has an average height of 5 feet. But from this, it is wrong to conclude that the whole class is 100 × 5 = 500 feet in height. This is the nature of the fallacy of composition. Again this fallacy arises, if we argue that since each man desires his own happiness, all men desire universal happiness. Other examples; If a shopkeeper closes his shop for a day, he loses custom, so that if all the shopkeepers of the town do so on the Ayudhapuja day, they will lose custom; Neither A nor B nor C is strong enough to lift this load; therefore A, B and C cannot lift this load.

(3) *Fallacy of Division*: This fallacy is the converse of the fallacy of composition. This consists in arguing that what is true of a class collectively, is true of the individuals distributively. For instance, this fallacy is committed if we argue that since all the plays of Shakespeare cannot be read in a day, Othello cannot be read in a day. This is wrong because, though it is impossible to read all the plays of Shakespeare in a day, Othello can be read in a day. Here is another example; the Public Service Commission makes

the appointments in a State; × is a member of the Public Service Commission, therefore × makes the appointments in the state.

(4) *Fallacy of Accident*: This has two forms which are (*a*) the direct fallacy of accident and (*b*) the converse fallacy of accident.

(*a*) The direct fallacy of Accident. This consists in arguing that what is true of an object generally is also true of it under specical or accidental circumstances.

e. g. He who penetrates a knife into another's body is punishable by law; a doctor penetrates a knife into another's body; therefore he is punishable by law. Here though the general statement is true it cannot be applied to the special case of a doctor. The following arguments also commit this fallacy. What is bought in the market is eaten, raw meat is bought in the market; therefore raw meat is eaten; Water is a liquid substance, ice is water; therefore ice is a liquid substance.

(*b*) *Converse fallacy of Accident*: This consists in arguing that what is true of an object under special circumstances, is also true of it normally. It is clear that this fallacy is the converse of the previous one. e.g. Aspro is good for head-ache; therefore take it every day with your meals. Here the conclusion is wrong. Aspro is good only under certain conditions. So it is wrong to say that one should take it every day. The same fallacy is committed if we argue that all people should use liquor because it is useful for certain diseases.

(*b*) *Fallacies of Presumption*

(1) *Petitio Principii*: This consists in assuming the conclusion in the premises. This is also called 'begging the question.' Here the argument is such that the conclusion to be proved is taken for granted. The

proof of the conclusion is necessary to establish the premises. This fallacy generally takes two forms.

(*a*) *Hysteron proteron*: Here a proposition is proved by the use of synonyms. e.g. Opium induces sleep, because it has soporific properties. The words 'soporific' and 'inducing sleep' are synonymous.

(*b*) *Argument in a circle*: This consists in proving the conclusion by premises which again depend upon the conclusion for their proof. e.g. We know that God exists because the Holy Books tell us so, and what the Holy Books say must be true, because they are of divine origin.

2. *Ignoratio Elenchi or Irrelevent Conclusion*: Very often in the course of a debate, one tries to have the upper hand by adhering to arguments which are beside the point. This may be done by pointing out the defects of the opponent, or by appealing to some higher authority or by appealing to the emotions etc. When such arguments which are beside the point are advanced this fallacy is committed. Ignoratio Elenchi may take the following different forms.

(*a*) *Argumentum ad hominem*: This consists in attacking the opponent by pointing out his defects and weaknesses, instead of meeting his argument. This is more a way of disgracing the opponent. But this is not reasonable because one should always attack an argument and not speak of the person. e.g. How can we listen to this man's advice, when it is well known that he has changed his opinion at least six times. Here instead of meeting the argument, it is said that the opponent has changed his opinion previously. But this does not mean that his advice is of no use. Here are two more examples of this fallacy. (1) In reply to the gentleman's arguments, I need only say that two years ago, he advocated the very measure which he now opposes; (2) The accused

must have stolen the watch, for he has had seven convictions for theft.

(*b*) *Argumentum ad ignoratiam* : This consists in exploiting the ignorance of the opponent. It lies in shifting the responsibility of disproving a certain thing on to the opponent, failure of which is taken to be the proof. e.g. God does not exist because no one has seen Him.

(*c*) *Argumentum and Verecundiam*. In this form of *Ignoratio Elenchi*, an appeal is made to a higher authority for proof, instead of using proper arguments. This is a mistake which is usually committed. It is customary with us to refer to a book or to a person to substantiate our point. e.g. God exists because the Holy Bible says so ; The soul is immortal because Plato is of that opinion ; Only the first figure is prefect, because Aristotle says so. In all the above cases, instead of proving the point by means of arguments, an appeal is made to some higher form of authority for proof.

(*d*) *Argumentum ad Populum*. This consists in appealing to the emotions and feelings and not to reason. Mob orators easily sway the crowd by such appeals. Appealing to reason will not be effective so far as the mob is concerned. But this is false for anything to be proved should be proved only by reasonable arguments. The funeral oration given by Mark Antony standing beside the dead body of Caesar, in Shakespeare's 'Julius Caesar,' is an excellent example of this fallacy. The following is another example. The theory of evolution cannot be true, for if it is true our ancestors should have been apes.

(*e*) *Argumentum ad baculum*. This consists in threatening another person to make him believe your point. Trying to apply physical force is no argument at all.

(*f*) *Fallacy of Objections*: This consists in rejecting anything on the ground that there are objections against it. It is illogical to consider that having objections against a theory is identical to its disproof. e.g. Hindi cannot be the national language of India because there are objections against it.

3. *Complex Question*: This consists in combining more than one question into the form of one question. If you answer 'yes' or 'no' to such a question you will be cornered e.g. Have you stopped copying in the examination? If you answer 'No,' it means that you are continuing it and if you answer 'yes' it means that now you have stopped copying which implies that previously you were doing it. But in reality you would never have copied at all. This question is made up of two questions, 'were you used to copying?' and 'if so, have you stopped it?' Other examples; Have you stopped beating your mother?; Have you given up drinking?

4. *Non-Sequitur*: This, otherwise known as the *fallacy of the consequent*, consists in drawing a conclusion which does not follow necessarily from the premises. e.g. He is not a sportsman for he is not tall. Here the conclusion is not a necessary one for, one need not be tall to be a sportsman.

Exercises worked out:

1. He talks with angels, for he himself says so, and a man who talks with angels cannot lie.

This argument involves the fallacy of Petitio Principii. The argument starts with what is to be proved and the truth of the reasons given depends upon the truth of the conclusion.

2. This patent medicine must be very good, for all the testimonials speak of its curative effect.

This is an instance of *argumentum ad verecundiam*. Here, instead of proving that the medicine is good, an appeal is given to the testimonials.

3. He has no appreciation for beauty, for he has no taste for pictures.

Here just because he has no taste for pictures, it is asserted that. he has no appreciation for beauty. Pictures form only an aspect of beauty. So the argument involves the converse fallacy of accident.

4. One can live without food, for one can live without rice or meat or wheat.

This argument involves the fallacy of composition. Thought it is true that one can live without one kind of food, it is wrong to make a general statement regarding the same.

5. There can be no doubt that the black races are intellectually inferior : for have they not smaller brains.

This commits the fallacy of non-sequitur. The conclusion does not follow from the reason stated.

6. All animals are active and as tortoise is an animal, it is active.

Fallacy of Division. Thought it is true that animals are active in general ; it is not true to say that tortoise is active.

7. The study of Philosophy is useless because it has no business application.

Non-Sequitur. Business application and the study of Philosophy are totally unrelated.

8. He who kills a man must be hanged. So all soldiers must be hanged.

Direct fallacy of accident. Though generally it is wrong to kill a man, it is incorrect to argue that a soldier is wrong in killing the enemy for it is a special case.

9. We know that God exists because our Scriptures tell us so ; whatever our Scriptures say must be true for they are of divine origin.

Petitio Principii. To prove that God exists, the reason given is that the Scriptures tell us so. To prove that what the Scriptures say is true, it is argued that they originate from God whose existence we want to prove. This is arguing in a circle.

10. How can you say now that democracy is a success is India? You held the opposite opinion a few years back.

Argumentum ad hominem. It is true that he might have had a different opinion previously That does not mean that he cannot change his opinion now. He may have sufficient reasons for doing so.

11. Humanity is bound to die out, for are not all men mortal ?

Fallacy of composition. Though each individual man is liable to death it cannot be argued that humanity will die out. This also involves Petitio Principii.

12. The theory of evolutlon is true because Tennyson has accepted it.

Argumentum ad verecundiam.

University Questions

I. Definition and scope of logic — relation to other sciences

1. Give what you consider to be the best definition of logic and see whether it satisfies all the conditions of a good definition.

2. State the relation of logic to (*a*) Psychology (*b*) Grammar (*c*) Language and (*d*) Ethics and Aesthetics

3. Explain why logic is considered a *normative* science. Distinguish between *normative* and *Positive* sciences.

4. Distinguish *art* from *science* and discuss to what extent logic can be regarded as an art.

5. Indicate the scope of logic. In what sense it may be called the science of sciences.

6. Examine critically the view that logic is a formal science and not a material science.

7. 'Some who have studied logic cannot reason well, therefore it is a useless study; some who have not studied logic can reason well, therefore, it is an unnecessary study'. Discuss.

8. How does science differ from ordinary knowledge ?

II. Terms

1. Distinguish between (*a*) abstract and concrete terms (*b*) positive and negative terms (*c*) absolute and relative terms.

2 What do you understand by connotation and denotation ? Discuss if connotation means all the known qualities of a thing.

3. 'Connotation and denotation very inversely' Discuss.

4. Distinguish between connotative and non-connotative terms. What kind of terms do you consider to be non connotative and why ?

5. Give the logical characteristics of the terms italicised.

(*a*) *Kautilya* is *the Indian Machiavelli* (*b*) *Forgiveness* is greater than *revenge*.

III. Predicables

1. What are predicables? Illustrate your answer.

2. What are the predicables used in the following: (*a*) Human beings are selfish (*b*) Scientists are dangerous (*c*) The Parsis are Indians (*d*) Mahatma Gandhi is the greatest peace maker.

IV Definition and Division

1. State and illustrate the rules of logical definition.

2. Explain (*a*) genetic definition (*b*) systematic definition and (*c*) definition per genus et differentiam.

3. State the rules of logical division. Distinguish logical division from physical and meta-physical divisions.

4. Indicate the relation between definition and division.

5. "The method of dichotomy depends upon the law of Excluded Middle." Explain.

6. What is division by dichotomy? What are its merits?

7. Examine the following:—

(*a*) Gold is a costly metal.
(*b*) Music is an expensive noise.
(*c*) Mind is a mental substance.
(*d*) Indians into North Indians, South Indians and Andhras.
(*e*) Men into Hindus, Christians and Mohamedans.
(*f*) Trees into trunks, branches and leaves.

V Propositions

1. Explain the following bringing out their relation

to one another. (*a*) term (*b*) concept, (*c*) proposition (*d*) judgment.

2. What is import of propositions? Explain the different views held by different logicians of the same.

3. Reduce the following sentences into their logical form, (*a*) Few men are free from vanity. (*b*) Not all philosophers are idealists, (*c*) Only children believe in miracles, (*d*) The Nazis are not the only Aryans, (*e*) He laughs best who laughs last, (*f*) The wicked can never enter heaven, (*g*) A few are found to be absent (*h*) Thieves never prosper.

VI. Opposition of Propositions

1. What is meant by opposition of propositions? Give illustrations.

2. Given the proposition 'Some men are unjust,' what can you infer about the, opposites.

3. Give the opposites of (*a*) Smoking affects throat (*b*) No coward need apply (*c*) Some victories are worse than defeats.

VII. Immediate Inferences

1. Distinguish between mediate and immediate inference and decide whether immediate inference is really inference.

2. Explain and illustrate (*a*) Obversion (*b*) Conversion (*c*) Contraposition (*d*) Inversion.

3. Draw all the inferences from (*a*) No poets are guided by reason (*b*) Some men are not sympathetic (*c*) All students should work hard.

4. Give the logical relation between the first and the rest of the following :—(*a*) All crystals are solid, (*b*) Some solids are crystals, (*c*) All non-solids are non-crystals (*d*) Some non-crystals are not solids.

5. Given the truth of the proposition, "All business men are cunning" what can you infer about (*a*) those who are not business men (*b*) those who are cunning and (*c*) those who are not cunning.

6. Examine the following inferences :—

(*a*) All novels are false.
∴ A lover of novels is a lover of false hood.

(*b*) Little learning is a dangerous thing. Therefore greater learning is a more dangerous thing.

(*c*) Uneasy lies the head that wears a crown.
∴ Easy lies the head that wears no crown.

(*d*) All mangoes are not sweet. Therefore all sweet things are not mangoes.

VIII. The Categorical Syllogism — Figure and mood

Note :—As each rule of the syllogism can be asked in the form of a question, all of them are not separately given below.

1. State and prove the rules of syllogism. (Prove that if one premise is particular, the conclusion will be particular, prove that the middle term must be distributed at least once etc.)

2. State and prove the rules of the first figure.

3. What are the special rules of the second figure ? Prove them.

4. Prove that in figure iii, the minor premise must be affirmative and that the conclusion must be particular.

5. State and prove the rules of the fourth figure.

6. What are the special characteristics of the four figures ?

7. Distinguish between strengethened and weakened syllogisms.

8. Why is E I O always valid while I E O is never valid.

9. Why cannot O stand as a premise in the first, as a major in the second, as a minor in the third or as a premise in the fourth figure ?

10. Why is it that only negative conclusions can be drawn in the second figure ?

11. Given that O is the major premise of a valid syllogism, determine the figure and mood.

12. If in a valid syllogism we substitute for both the premises their contradictories, can we prove the contradictory of the original conclusion.

13 Prove that the middle term cannot be distributed twice when the conclusion is universal.

14. If in a syllogism the major term be distributed in the premise but not in the conclusion determine the figure and mood.

15. Discuss the figures and moods in which only a particular proposition can be the conclusion. Give illustrations.

16. Point out in which figures and moods the conclusion of a syllogism can be a Universal Negative proposition. Give illustrations.

17. Prove that wherever the middle term is subject in the major premise, the minor premise must be affirmative.

18. If in a valid syllogism, the middle term is distributed only in one premise and the other premise is negative, determine its figure and mood.

IX. Reduction

1. What is reduction ? State its value.

2. Construct a syllogism with a negative conclusion in the Third Figure and reduce it to a mood in the First Figure.

3 Construct a syllogism in Baroco to prove "Not every one that sits for an examination comes out successful" and reduce it directly and indirectly.

4 Reduce the following syllogism to the first figure directly and indirectly.

All Statesmen are far sighted
Some Politicians are not far sighted
∴ Some Politicians are not statesmen.

X. Mixed Syllogisms

1. State the rules of the mixed hypothetical syllogism. To what rules of the categorical syllogism do they correspond? Illustrate your answer.

2. State the rules of mixed hypothetical syllogism and illustrate the fallacies which would arise from the violation of these rules. Reduce the example which you take to the categorical form and point out the fallacies which then occur.

3. Explain and illustrate the two moods of the hypothetical syllogism.

4. Explain and illustrate the two forms of the Disjunctive syllogism.

5. What are the fallacies which may arise in a disjunctive syllogism.

6. What is a dilemma? Explain the different kinds of dilemma and illustrate the three ways in which a dilemmatic argument may be attacked.

7 Make a dilemma to show that men should fight and peace is impossible and rebut it.

8. What are the frequent sources of fallacy in a dilemma? Give illustrations.

9 'A dilemmatic argument is more often fallacious than not' why.

10. Distinguish between categorical and conditional syllogisms. What aspects of thinking are emphasised by them respectively?

11. Examine the following arguments.

(*a* If the strike had been called off, the men would be back at work, but since the men are not back we suppose that the strike has not been called off

(*b*) Advice is useless, for if people are good, they do not need it and if they are bad, they do not heed it.

(*c* If you work hard, you will get a prize. You have got a prize, so you have worked hard.

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(*d*) Students are either intelligent or industrious. This student is industrious. Therefore he is not ıtelligent.

(*e*) If he had left the house a few moments ırlier, he would no doubt have caught the train; but s he was delayed, he must have lost it.

XI. Enthymeme—Sorites

1. Explain the different kinds of enthymemes.

2. What is a sorites? State and prove the ıles governing Aristotelian and Goclenian sorites. Vhat are the differences, between the two.

3. Examine the following.—

(*a*) He must be foolish to take such a step.

(*b*) This syllogism must be valid for it has three terms.

(*c*) Great lawyers are not good speakers for example Ramachandra.

XII. Mills criticism of Syllogism

Explain and examine the criticisms that every llogism involves the fallacy of Petitio Principii.

XIII. Deductive Fallacies

ote :—The student should be in a position to explain any fallacy and as such no particular question is given here.

Examine the following arguments :

1. A philosopher may also be a literary artist. ok at Plato.

2. Learned men sometimes become mad. As he is t learned, there is no danger to his sanity.

3. All works of Kalidasa cannot be read in a day 1 therefore " Sakuntala " cannot be read in a day.

4. Who are you to question the economics of the ırka ? Don't you know that the Father of the nation ached it throughout his life ?

5. Ten is one number. Six and four is ten. Six four are therefore one number.

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6. Some Mathematicians are able philosopher Consider whitehead, Russel and others.

7. Blood is a colour for it is red and red i colour.

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8. A doctor is a man. Therefore a good docto a good man.

9. A is a friend of B ; B is a friend of C ; and A is a friend of C.

10. Some men are handsome and some men dishonest ; therefore handsome men are dishonest.

11. The white races are inferior to the coloure for whiteness is due to lack of pigmentation.

12. That lawyer's conduct is inconsistent ; in last case he argued on behalf of one person and in present one, on behalf of that person's rival.

13. Eleventh hour preparation is invariably h nations should always be ready for war.

14. Last year the crops failed. How can expect good crops when we do not possess independe

15. Married men are unhappy; unmarried men unhappy too. Married or unmarried men are dest to be unhappy.

16. This regiment cannot succeed in action each soldier in it has some defect.

17. Freedom is the birthright of man ; so no should be imprisoned.

18. He is a very bad marksman, hence it is to stand in front of the object he is aiming at.

19. There is no harm in allowing boys to c trees. If they are confident, they are safe ; if they nervous they will not climb high enough to run a ri

20. If the monsoon is very late, the crops suffer. This year we expect food crops as the mon was not late.

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